The Dock & Harbour Authority

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Reclamation for extension of John Summers & Sons Ltd. Steel Works at Shotton

The Dock & Harbour Authority

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Editorial Notes

Port Swettenham, Malaya

Our leading article this month is a summary of a Report of an inquiry into the administration and methods of cargo working at Port Swettenham. The inquiry was conducted in August, 1957, by Sir Eric Millbourn, and his Report issued subsequently comprises a practical analysis of the difficulties encountered in the present system of port working which should be of value to many other ports confronted with similar problems.

In addition to a survey of the prevailing conditions and recommendations for improvement as a short-term measure, the Report also considered whether "any changes are required in the status and administration of the port, and if so, when, and to make recommendations thereon." This section deals with the proposed new wharves to be sited at the North Klang Straits and advances suggestions for certain improvements on the way in which the expanded port should be constructed and administered.

The present port, which was constructed at the beginning of this century, has been handicapped by being sited in an area not capable of any great expansion as it is limited by the Klang River to the north and the Sunger Aur to the south. After the First World War a period of rapid expansion showed the limitations of the facilities available and plans were therefore prepared for the North Klang Straits development.

Owing to trade depression during the 1930's, however, followed by occupation by Japan during the Second World War, the scheme was held in abeyance. It was revived when trade at the port reverted to its pre-war pattern and there was again a demand for increased accommodation.

Meanwhile, consequent upon the damage and wanton destruction inflicted by the Japanese during the war years, the existing port was in such a derelict condition that all the energies of the administration had to be applied to restoring the available facilities. In addition to the rehabilitation works which have been completed since 1945, further improvements have been carried out or are in course of completion. The major works include an extension of the Coastal Wharf by 350-ft., a transit shed of 45,000 sq. ft. to be built immediately behind this wharf, and the enlarging of the Export Sheds. In addition work has started on a new Marshalling Yard to serve the proposed new port and to give relief to the present badly congested yard.

When these projects are completed there will be little or no room for further development at the present site so that the extensions at the North Klang Straits have become essential. Despite the urgent need, however, the preliminary work on the new project, which is estimated to cost a total of £3,500,000 had to be suspended early this year because the Malayan Government was unable to guarantee the necessary finance. It is therefore gratifying to learn that the U.S.A. recently approved a loan of $10 million from the American Development Loan Fund, and that tenders are shortly to be invited so that the main work can be started early in 1959.

River Pollution in Tidal Waters

A paper by Dr. T. L. J. Coxon, Medical Officer of Health, Tyne Port Health Authority, dealing with the problem of pollution at Newcastle-upon-Tyne, was presented recently at a meeting of the Royal Society of Health at South Shields. The subject is of importance to many port authorities; abstracts of his address are therefore included on a following page in this issue.

In his opening remarks, Dr. Coxon pointed out that "Rivers have from time immemorial ranked amongst the greatest benefactors of mankind; they have provided water for drinking and cooking; drained away surplus and flood water from productive land; supplied moisture and facilitated irrigation in dry areas; and provided a means of easy transport from the hinterland to the sea. The course and direction of rivers played a great part in the subsequent development of the area. The siting of towns at fordable points, or where the river presented easy bridging possibilities, was usually more important from the political and administrative aspect than from the embryonic industrial side.

"So it was from the earliest times until about 120 years ago, when the picture changed, at first slowly, but of recent years with almost terrifying rapidity. . . . Cities and industry seized for exploitation the most suitable sites, regardless of their distant future . . . . Rivers lost their old character and became solely a convenient medium for transport or refuse disposal. If trade was multiplied, trade waste products were increased by a like proportion. The policy was to use the river at hand for the disposal of these waste products, thus keeping costs at a minimum, and to plan for the present with no thought for the future.

"It is surprising that local authorities, determined to improve the slums of their towns and villages by extensive rebuilding, the creation of parks, green belts, playing fields and gardens, are also content to perpetuate and even to extend a filthy practice originally started as a cheap and easy way of disposing of their rubbish."

There is no doubt that in many of the largest riparian industrial centres, the problem of river pollution is now acute. There also appears to be difficulty in determining to whom belongs the responsibility of preventing the pollution of tidal waters. The powers which could be used by the river boards are withheld from them by the central authority on grounds of economy and the position of the port authorities also seems ambiguous. A recent statement by the Chairman of the Tyne Improvement Commission emphasises the prevailing uncertainty.

"Government Committees have studied the question of river pollution generally, and a mass of evidence has been analysed and reported upon. The outcome appears in two recent Acts of Parliament, "The River Boards Act 1948" and "The Rivers (Prevention of Pollution) Act 1951." Under these Acts the River Boards which have been established in various parts of the country are empowered to deal with pollution.

"The 1951 Act extends to all streams and rivers, but it only includes tidal waters or parts of the sea in so far as those areas

Editorial Notes—continued

have been declared to be streams under the Rivers Pollution Prevention Act 1876, or may be so declared under the 1951 Act. The tidal reaches of the Tyne have not been declared to be streams, but that is not to say that they cannot be. The Minister of Housing and Local Government can make an Order at any time declaring the whole or part of our tidal waters as waters within the meaning of the 1951 Act. If that were done, the introduction of polluting matter into the specified waters would be made a punishable offence. That is what the Act contemplates. The legislation is already in existence. It only needs the Minister's Order and the River Board can go into action.

"As individuals and as a body we are just as much horrified at the pollution of the river as any other person or body on Tyneside or elsewhere. As a Dock and Harbour Authority, however, the prevention of pollution is not our function."

The position needs clarification as it is obvious that the cost of any large scale scheme for cleansing the tidal reaches of the river will be enormous and beyond local resources. It would appear, therefore, that to effect a permanent improvement, the Government must take a more active part in the problem.

Dockers' Attitude to Flags of Convenience

The flag-of-convenience controversy has now entered the sphere of direct action. The International Transport Workers' Federation have declared their intention to boycott, from December 1 to 4 inclusive, those ships whose owners have not concluded collective agreements recognised by the Federation. According to the I.T.W.F., there are 1,900 ships registered under the flags of Panama, Liberia, Honduras and Costa Rica. About 1,200 are to be boycotted; 500 are laid up and 200 are working under satisfactory agreements.

The Federation at its last congress decided to apply a general boycott to all vessels registered with the four countries named where there were no collective agreements on wages and working conditions. A special committee, over which Mr. Tom Yates, general secretary of the National Union of Seamen, presided, met in Antwerp and appointed a sub-committee to prepare plans for the boycott. This meeting was attended by representatives of seafarers and dockers of Great Britain, Scandinavia, the Netherlands, Belgium and Greece.

In November the plans were approved at a meeting in Brussels of the International Confederation of Free Trade Unions, which embraces the international federations of transport, petroleum and metal workers. A communiqué issued at the time said that the boycott would apply to those ships sailing without acceptable agreements with the I.T.W.F. The meeting was presided over by Mr. T. O'Leary, the national secretary of the docks group of the Transport and General Workers' Union.

Reaction on the part of shipowners was immediate. The International Shipping Federation issued a statement that they opposed the boycott for two reasons. The first was that it would involve a breach of national collective agreements and in some cases of national law. They could not agree to the disruption of national industrial agreements by the action of an international body which was not party to those agreements. The second reason was that the tonnage under flags of convenience would not be diminished to any significant extent by collective agreements on employment conditions. The advantage of flags of convenience lay essentially in lower taxation, not in bad employment conditions and if every flag of convenience ship were to sign a suitable collective agreement on crew conditions with the I.T.W.F. shipowners would still be no nearer a solution of the problem.

From across the Atlantic came a similar vigorous counter. An American Committee for Flags of Necessity (the term Americans substitute for "flags of convenience") was set up at a meeting in New York of substantially all the major companies owning ships under "Panhonlib" flags—five to seven million tons deadweight of vessels are said to have been represented by the committee. Mr. Erling D. Naess, president of the Naess Shipping Co., Inc., is the chairman and the primary purposes of the new organisation are "to counteract false and misleading propaganda; to uphold the high standards of American-owned 'flag of necessity' ships, and to deal with any problem of common interest to American owners of these ships."

Mr. Naess warned the I.T.W.F. that the proposed boycott would constitute a clear case of flag discrimination, represent an entry by the Federation into the field of foreign policy, and would be a challenge to international relations and to governments themselves which could not fail to provoke counter action of the most serious nature.

Here it may be interpolated that, according to trade figures issued in Washington, in 1957 American ships flying flags of convenience carried 33.1 per cent. of the country's dry cargo imports and 22 per cent. of the exports. It has been estimated, says the New York "Journal of Commerce," that between 40 and 50 per cent. of vessels flying the Liberian, Panamanian and Honduras flags are directly or indirectly controlled by American capital. If, adds the paper, the traffic handled by American-flag vessels and those of the flags of convenience are combined, the share of United States waterborne foreign trade represents 55.9 per cent. of dry cargo imports, 41.4 per cent. of dry cargo exports; 69.2 per cent. of tanker imports and 36.7 per cent. of tanker exports.

The Niarchos group have announced their intention to fight the boycott, if directed against their ships, with all available means, including legal action in the courts of any country where such incidents may occur.

That representations to the United States by the Governments of Europe's maritime nations are at least under way is indicated by a statement from Washington that any protest lodged will receive careful consideration. The arguments, now familiar to most people, are repeated—that flags of convenience are necessary to meet foreign competition, that direct control would be resumed in case of war and that the Government cannot dictate to private companies what they shall do, so long as they do not violate United States law.

This, then, is the position which those in pursuit of a boycott have to face. Considering the prevailing shipping depression (over 7½ million gross tons are laid up in the world) declining activity in the shipbuilding and ship repairing yards, slack employment at several ports, and the approach of Christmas, it is debatable whether the time has been well chosen for such a demonstration. Furthermore, there are already repercussions from some port managements. Amsterdam dockers have been warned that "any boycott would violate their employment contract" and the Committee of German Port Authorities has stated that if the German Unions support the boycott, they will be guilty of "a flagrant breach of labour peace."

The fact that the hold-up is to be of such short duration suggests that the organisers themselves are not too happy about the position and probably look upon it more as a token than a practical boycott.

A Divergence of Views

As expected, the article by "Poseidon" in last month's issue has elicited divergent opinions concerning the best methods of finding a remedy for dock strikes. A selection of the letters received to date will be found on a following page. Although some of the views expressed may be thought to wander from the points at issue, they nevertheless indicate a general awareness of the need to find a solution to an intractable problem.

One writer commented that the remedies suggested scarcely appear to be within the realms of feasibility and therefore can hardly be said to be practicable. Some criticism was also advanced about the advisability of ventilating the problem so freely, saying that to do so is not helpful to the maintenance of good industrial relations leading to industrial peace. This attitude, in our view, is quite unconstructive and implies that nothing should be done to disturb a quiescence which is probably only temporary and is liable to be disrupted whenever the malcontents in the industry see an opportunity of doing so.

As we stated last month, any changes suggested to improve the present relationship between the employers and the dockers are sure to arouse opposition. To be apathetic or to merely criticise is no answer to the problem. There is an urgent need for a remedy and this will most likely be found by free discussion and a pooling of ideas.

Port Swettenham, Malaya

Report on Recent Inquiry into Administration of the Port

Terms of Reference

IN AUGUST, 1957, Sir Eric Millbourn was invited by the Minister of Transport, on behalf of the Government of Malaya, to visit Kuala Lumpur and Port Swettenham to enquire into certain aspects of the labour situation and administration of the port. His terms of reference were:

"Having regard both to the present and to the future circumstances of the port of Port Swettenham,

(a) to inquire into the method of employment of wharf, stevedore and related labour at the port of Port Swettenham, and also into the industrial relations machinery at present in existence there; and to make any necessary recommendations for the immediate improvement of the method of employment and of the industrial relations machinery;

(b) to make any necessary long term recommendations regarding such matters; and

(c) to consider whether any changes are required in the status and administration of the port, and if so, when to make recommendations thereon."

Sir Eric was assisted in his enquiries by Mr. Francis Cave, who was until recently General Manager of the Mersey Docks and Harbour Board, Sir Ian Parkin, formerly General Manager of the U.K. National Dock Labour Board, and Captain Alastair Smith, a former Port Manager at Mombasa.

The Committee made a detailed study of the installations and facilities of the port of Port Swettenham, both from the landward and seaward sides; in addition they visited the site of the proposed extension of the port at North Klang Straits, and examined the progress made so far on the landward approaches to the new extension. Apart from this practical study, they had the opportunity of examining a number of memoranda which they received from interested persons and organisations, and of hearing evidence and views from a large number of those concerned with the administration and work of the port.

The Place of Port Swettenham in the Economy of Malaya

Port Swettenham has for many years been increasing in importance as a gateway for traffic, and particularly for cargo traffic, into and out of the Federation of Malaya. Its proximity to Kuala Lumpur, now the Federal capital, is likely to make it an even more important port in the future than it has been in the past. Indeed, in view of the Government's plans for the development of the agricultural, industrial and mineral resources of the country, it is certain that there will be a considerable increase in traffic through all the ports of Malaya.

For these reasons it is essential that Port Swettenham should be well equipped and efficiently operated. What can be done to achieve this will depend on the facilities the port offers, the way they are managed, and the way in which labour and administration work together in the common interest. There are a number of serious physical limitations to the present port, largely arising from the fact that it was designed for working in close association with the railway system, with goods moving to and from the wharfside wholly by rail. Apart from this fundamental difficulty, which seriously affects working at the wharfside, various developments through the years — for example the railway marshalling yard — have hemmed in the port area and made improvements by way of expansion very difficult. The considerable growth in traffic, coupled with the increasing importance of road transport for bringing goods to and from the port, has shown that by modern standards the layout leaves a great deal to be desired.

It is fortunate, therefore, that at the present time, when major developments are about to take place, there should be an opportunity of taking stock with a view to ensuring that the expanded port will be able to play its full part in the development of Malaya.

FACILITIES AND SERVICES OF PORT SWETTENHAM

Port Swettenham is situated at the mouth of the Klang River, about 26 miles from Kuala Lumpur. It is connected by rail with the Malayan Railway system, and there is a railway connection with the east coast line. There are roads connecting the port with the main road system of Malaya, and new road developments have considerably increased its hinterland by bringing large parts of the east coast States within easy access of the port. Thus it not only caters for the more populous and highly developed States of the western coast, but can contribute to the development of the east coast States. The port has a considerable and increasing trade. Dry cargo imports in 1956 amounted to 559,248 deadweight tons, an increase of some 19,000 tons over 1955; exports in the same year were 340,769 tons, an increase of nearly 61,000 tons over 1955. The overall increase for imports and exports therefore amounted to about 11 per cent.

Administration

The port is owned and administered by the Malayan Railway Administration, whose General Manager is the Port Authority. He is advised by a Statutory Board known as the Port Swettenham Board. The Board consists of the General Manager of the Railway as Chairman, and thirteen other members, including one representative each of the Malay, Chinese and Indian Chambers of Commerce, three representatives of shipping, two representatives of industry and representatives of the Federal and State Governments. The General Manager may consult the Board on any matter concerning the administration and working of the port, and he has a statutory obligation to consult them on such important matters as alterations in tariffs, capital expenditure, substantial changes in the organisation of the port, questions of expansion and development and other major questions of policy.

Management functions of the port are carried out by a Port Department whose head is the Chief Port Manager; he is directly responsible to the General Manager of the Railway. Under the Chief Port Manager there is a Port Manager who is responsible to him for day-to-day working.

Independent of the Port Department there is a Harbour Master who is an officer of the Federal Government. He is responsible for the lighting, buoying and general conservancy of the port and its approaches, and he is also Chairman of the Pilotage Board.

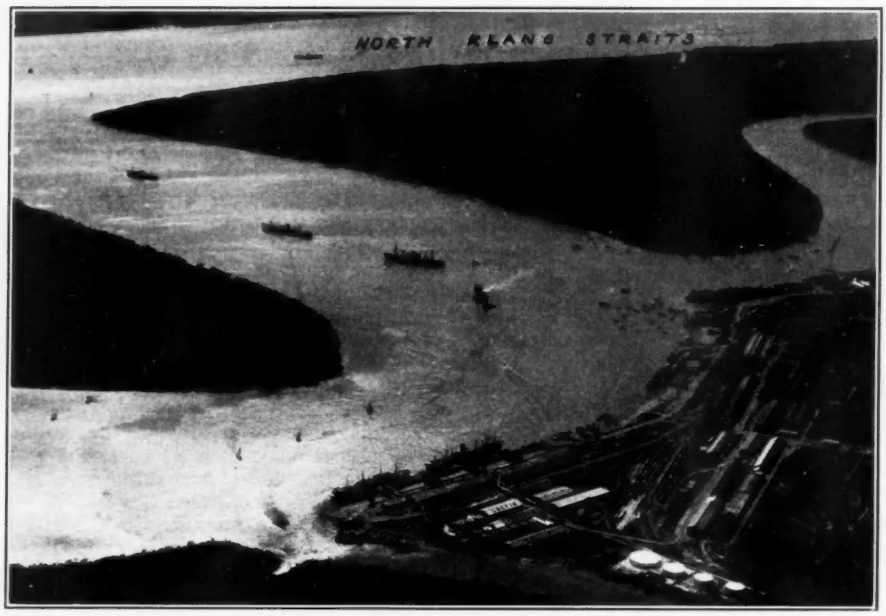
Pilotage is not compulsory in the two entrances to the port through the North and South Klang Straits. It is, however, compulsory for ships berthing or unberthing at the wharves at Port Swettenham to have a licensed pilot on board, though Coasting Masters are granted exemption. Pilots are licensed by a Pilotage Board. They have formed themselves into an Association and the Senior Pilot arranges movements of ships in the harbour by agreement with the Shipping Agents. Neither the Port Authority nor the Harbour Master has any jurisdiction over the movements of ships either to buoys in the Klang Straits or to and from wharves.

Wharves, Transit Sheds and Services

The wharves for ocean-going ships consist of an open piled jetty about 1,000-ft. in length and 50-ft. in breadth, with a depth of water varving from 32-ft. to 40-ft. L.W.O.S.T. This jetty is constructed about 100-ft. from the shore high water line, and provides berths for two normal dry cargo ships. There is road access to the jetty by means of four approach jetties and a single line railway is led over a piled structure to provide three tracks, connected by cross-overs on the jetty. The jetty is equipped with electric portal cranes running on a 9-ft. track.

The coastal wharf is about 600-ft. long and 45-ft. broad, and is also about 100-ft. from the shore. It has three approach jetties as well as rail access. The depth of water at the coastal wharf is about 18-ft. This wharf is being extended 350-ft. in length towards the south and when completed will be served by rail from the north and from a point about half way along its

Port Swettenham, Malaya—continued



Aerial view showing existing wharves and ships anchored in stream.

length. At this wharf electric portal cranes are provided, and in addition there are five mobile cranes available.

Ships may also anchor to buoys in the stream, and in this case cargo is loaded or discharged by lighters. There is a lighterage wharf at the extreme southern end of the port area. The wharf is 334-ft. in length and is served by ten dead-ended rail tracks which are taken off from a single line at a distance of some 350-ft. behind the wharf area. Facilities here are small electric cranes and one 10-ton hand crane. Heavy lifts up to 40 tons can be discharged from lighters by using the railway break-down cranes.

In 1956, of the total import and export dry cargo handled, 585,536 tons (or some 65 per cent) were handled over the wharves and 314,481 tons were lightered.

Owing to the way in which the wharves are constructed, transit sheds are not on the wharves themselves but are sited on the shore immediately behind the ocean and coastal wharves. There are sheds of some 120,000 sq. ft. in area behind the ocean wharves, and 45,000 sq. ft. behind the coastal wharves. Apart from these facilities provided by the Railway Administration there are sheds totalling 171,000 sq. ft. constructed by private firms in various parts of the port area. These are used for storage of imports or for the preparation of rubber prior to shipment; there are two sheds serving rubber conveyors, which carry export rubber to three floating pontoons between the ocean and coastal wharves, whence they are lightered to the ships. The Railway Administration also provides storage sheds totalling rather more than 100,000 sq. ft. and there is an open storage area of some 80,000 sq. ft. All transit and storage sheds are served by road and rail.

There is a bulk petroleum tank farm east of the lighterage wharf, from which pipe lines are laid to the south berth of the ocean wharf. There is also a tank farm for bulk liquid behind the north berth of the ocean wharf, and cargoes such as latex, palm oil and coconut oil are pumped to the wharf by overhead pipe lines.

Lighters and Tugs. There is a lighter fleet of 71 with a total capacity of 5,700 tons, and orders have been placed for six additional lighters of aluminium construction. These lighters are owned and provided to users by the Port Authority. There are four lighter towing tugs and a berthing tug which can be made available for lighter towing.

Wagons and Mechanical Transport. The Port Department owns a large number of vehicles and wagons of a total carrying capacity of well over 4,000 tons, for internal movement of cargo within the port area, and there are four shunting engines for this purpose. Rail wagons are also provided by the Railway Administration. The Department operates a fleet of 21 Scammell Horses and 63 trailers for movement of cargo between ship's side, sheds and yards.

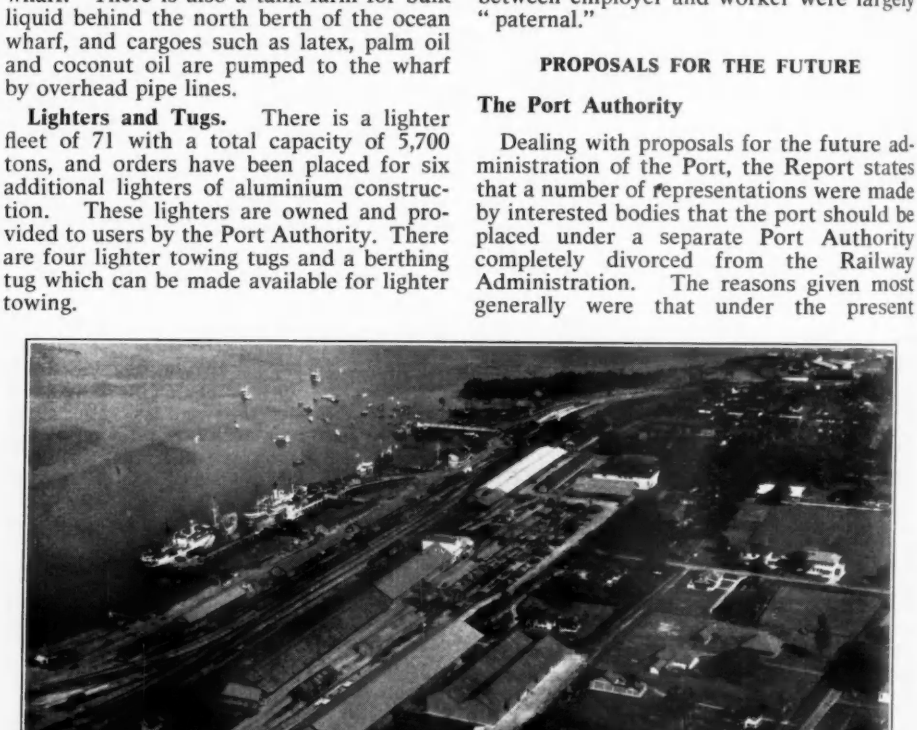
Cargo Handling and Labour. The labour for operating the wharves, sheds and yard areas is provided by the Cargo Handling Corporation Limited, a subsidiary of the Railway Administration, who hold 98 per cent of the shares. The Chief Port Manager is Chairman of the Corporation. Labour for stevedoring is provided partly by the Corporation and partly by two private companies licensed by the Railway Administration.

Originally all dock labour was employed by private contractors appointed by shipowners and the Malayan Railway for ship and shore work respectively. In June, 1946, the Harbour Workers' Trade Union was formed. Little is known of labour relations or of conditions of employment before that date, though it is known that relationships between employer and worker were largely "paternal."

PROPOSALS FOR THE FUTURE

The Port Authority

Dealing with proposals for the future administration of the Port, the Report states that a number of representations were made by interested bodies that the port should be placed under a separate Port Authority completely divorced from the Railway Administration. The reasons given most generally were that under the present



Aerial view showing coastal wharf and godowns.

Port Swettenham, Malaya—continued

Fork-lift truck working in transit shed.

Rubber conveyor on pontoon jetty.

organisation the interests of the port were subordinated to those of the railway; in particular, it was alleged that in cargo handling preferential treatment was given to the Cargo Handling Corporation (which is a virtually wholly owned subsidiary of the railway) and that cargo carried by road had to take second place to that carried by rail. It was further suggested that there was no incentive for the port, as such, to improve its efficiency; also, that if the port and railway were separated, the port would not be affected by labour troubles within the organisation.

Although realising the force of these arguments, the Report does not think it appropriate, at least for the present, to have a separate port administration.

It is apparent that the port gains substantial benefits both financially and otherwise, from its close link with the railway, but it seems that neither the port nor the railway has made serious efforts to assess the value of these benefits. It is therefore recommended that the finances of the railway and the port should be completely separated. By this is meant not merely that they should publish separate accounts, but that all charges properly due from the port to the railway—including an appropriate share of overheads—should be taken account of; the port should pay, or be debited at, a reasonable commercial rate for any services rendered. It might be desirable to secure the advice of an independent chartered accountant to decide how this might best be done.

It is clear that for as long as the port continues its present association with the Malayan Railway Administration, the Port Authority must be the General Manager of the Railway. The scheme by which a Board — the Port Swettenham Board — advises the General Manager seems to be a reasonable working arrangement for running the port. The Board includes representatives of commerce, industry and shipping, as well as of the Government. It is, however, illogical and improper that the General Manager of the Railway should be the Chairman of a Board set up to advise him. In spite of the safeguard by which the General Manager cannot go against the wishes of the Board without the agreement of the Minister, obviously the arrangement is open to the criticism that the Board is placed in a position where it might be influenced by the railway.

The Report therefore suggests that the Chairman of the Port Swettenham Board should not be the General Manager of the Railway, but should be elected by the Board from among their number. If considered necessary, a representative of the Railway Administration other than the General Manager might be added to the Board, but otherwise the constitution of the Board should remain as at present.

Dealing with the officers and staff of the Port, the Report suggests that, in general, they should be specialists in port working rather than railway experts; every effort should be made to make the port service atractive in order to secure men of the highest calibre at all levels of the administration.

Port Working and Cargo Handling

A number of criticisms were made to the Committee of the present cargo handling arrangements. Handling on the wharfside is carried out by the Cargo Handling Corporation Limited (which is effectively the Port Authority providing various services) and cargo handling on ship board is carried out by three stevedoring companies — the Cargo Handling Corporation again and two private companies, the Eu Lee Landing and Shipping Company and Seng Lee and Company. It was suggested that there is unfair competition between the Corporation and the private stevedoring companies because the Corporation can charge uneconomic rates for stevedoring and recoup itself from charges for the wharfside services it provides. On the other hand, there is dissatisfaction among traders and shipowners with the standard of work and efficiency of management of the private companies. Finally there is dissatisfaction over labour questions, particularly as far as the independent companies are concerned, and there is strong Union criticism of their labour relations.

The Report states that these criticisms can be largely met, without too drastically altering the present set-up. What is essential is that the structure of the organisation concerned with cargo handling must be so devised as to ensure that the division of responsibilities and duties of the various interests tend towards the most efficient working of the port. First of all, this means that the ship or its agent must be broadly responsible for the discharge and loading of its cargo; the port must accept responsibility for cargo which comes into its charge. Secondly, there must be no more monopoly in the port than is necessary for practical reasons, but competition where it exists must be genuine and based on realistic charges.

For practical reasons, it is difficult to avoid giving a virtual monopoly to the Port Authority for cargo handling on the wharves, since they should take responsibility as bailee for cargo they take into their charge. The Report therefore suggests that the Cargo Handling Corporation in its present form as a limited company should be abolished. A new division of the Railway Administration, to be known as the Malayan Port Service, should be set up to act as the agent of the Port Authority for the supply of wharfside labour.

Although the Malayan Port service organisation, as the agent of the Port Authority (which would remain as bailee for cargo) would provide wharfside cargo handling services, the Report considers that it would be more consistent with the responsibilities of ships under the Bills of Lading for cargo if work on board ship ceased to be carried out—even indirectly—by the Port Authority, and stevedoring work were done by private stevedores only. It would be very much in the interests of trade and commerce that the risk of a monopoly of this work by a body like the Cargo Handling Corporation should be removed.

It is equally essential, however, that the

Port Swettenham, Malaya—continued

View of wharf No. 6 and godowns.

work on board ship should be carried out efficiently, and that the companies organising it should be well run, and it is mainly in the hands of the shipowners or their agents to achieve efficient stevedoring. If they consider that the present independent companies are in fact not efficient organisations, it is for them to find the remedy.

Improvements in the Present Port

The Report then referred to the unsatisfactory layout of the present port. Being designed for cargo to be carried to and from the port by rail, it has not readily adapted itself for both road and rail transport. Moreover, because of the way it has been built up it has not the flexibility to accept overloads of cargo beyond the capacity for which it was originally intended to cater. It is at present working considerably over capacity. Since it will be necessary to make the fullest and best use of the present facilities for some time, until the North Klang Straits extension is complete, it is important that every effort should be made to speed up the flow of cargo.

Some major works are already proposed which will go a long way towards increasing the capacity of the present port. There is a plan, for example, for the removal of the railway marshalling yards within the next year or two from their present congested site to a site further away from the port area. This, coupled with the construction of a new siding to act as an exchange siding between the railway system and the port workings, will give some relief in the operation of the port.

One way of easing the congestion would be to make fuller use of lighters for dealing with ships in the stream; in particular, use might be made of private lighterage, for at the moment all lighters are supplied by the Port Authority who do not allow private lighters to operate. There are obvious advantages in providing more lighterage by allowing private lighters, but there are, too, serious disadvantages. There is at the moment insufficient room to take many more lighters. A new lighter berth is now being constructed by the port, and this may afford some relief particularly if it is used in conjunction with the new transit shed just being completed. Treated in isolation, however, full use of the new berth will merely add to the cargo passing through the bottleneck of the port at its narrowest point.

The Report recommends therefore, that as a temporary expedient full use should be made of the Klang River for lighters. At the moment timber and rubber are handled at jetties in the river and these jetties, which are privately maintained, are licensed by the Port Authority because they themselves do not provide sufficient facilities for these cargoes. They are licensed only from year to year, however, and the Authority are unwilling to license use of the river by any other traffic. In order to relieve the burden on the main port facilities, the Port Authority should allow the construction of further private jetties. As these would hardly be necessary when the port is extended they might be of a temporary nature and need not therefore be over expensive.

Labour

A number of criticisms of the labour situation are associated with the fact that there are three companies which control labour in the port. In essentials, however, the problem is one common to ports throughout the world. Violent fluctuations in the volume of work are a universal problem of port operation, and this irregularity—which vitally affects the employment and earning of dock workers—is due to factors beyond the control of the port operators. Much can, however, be done to limit the effects of irregularity by regulating the number of workers, by a fair division of the available work, and by the operation of schemes for the payment from a common fund of men who are available to work but for whom work cannot be provided.

The problem here is aggravated by the local circumstances already referred to, and especially by differences in the conditions offered by the various employers. The basis of a settlement does, however, exist. Port Swettenham has had nearly ten years' experience of agreements providing for work (or wages in lieu) for a specified number of days each month, and for the direct payment to each worker of his monthly earnings with two advance payments during the month.

Present oil installations near Port Swettenham Wharf.

Port Swettenham, Malaya—continued

With this background of experience considerable improvements could be effected without making any very drastic changes. For a port the size of Port Swettenham it should not be necessary at this stage to set up an elaborate Dock Labour Board. There are a great many improvements of a kind usually associated with dock labour schemes which should be made, but these could well be carried out through the agency of an efficient Joint Council which should be set up for the whole port, and would be responsible for all matters relating to the employment of dock workers in the port area aboard and ashore, including:

(a) **Labour Supply**—The definition of dock work and recruitment and registration of dock workers.
The allocation of registered and non-registered men to dock work.

(b) **Terms and Conditions of Employment**—Negotiation of all agreements covering the employment of dock workers.
The establishment of machinery for the prompt settlement of disputes.
The payment of all monies due to daily dock workers, including wages, "availability pay," sickness and holiday pay and allowances of all kinds.

(c) **Welfare Services** — The maintenance and development of all existing services including housing.

The monies necessary for the carrying out of these responsibilities, other than the payment of wages, should be provided from a management fund to be set up from a percentage levy on earnings, or if preferred from a tonnage levy on goods.

The Council should consist of an independent Chairman appointed by the Port Swettenham Board and an equal number of representatives appointed by the licensed employers and the shipowners on the one hand, and by the Unions on the other.

One of the first duties of the Joint Council should be to institute a registration scheme covering all dock workers employed in the port. They would be divided into "regular gangs," working for the same employer over a period, and "daily workers" who would be allocated to employers by the Council. All would be entitled to work, or to basic wages or "availability pay" in lieu. Regular workers could be transferred on a day to day basis to another employer if their regular employer had no work for them. Tally Clerks should be separately registered.

With regard to the working of overtime, the Committee observe that it seems to be accepted that the physical limitations of the port can best be overcome by sustained round-the-clock work. Sunday is an ordinary day and the evidence shows that on average men work at least half their weekly rest days. The port operates for at least 360 days a year and this throws an intolerable burden on the supervisory staff. In 1948 the Gourlay Court of Inquiry recommended that agreements should enable a man "to earn a living wage by working diligently during the normal eight hour day." Little or nothing was done at the time to implement this recommendation although the Tonnage Payment Agreement of the 26th April 1953, between the Cargo Handling Corporation and the Harbour Trade Union contains the following Clause:

"(11) It is agreed in principle that where work is ordered to continue throughout the night fresh gangs shall be brought on duty at 6.30 p.m."

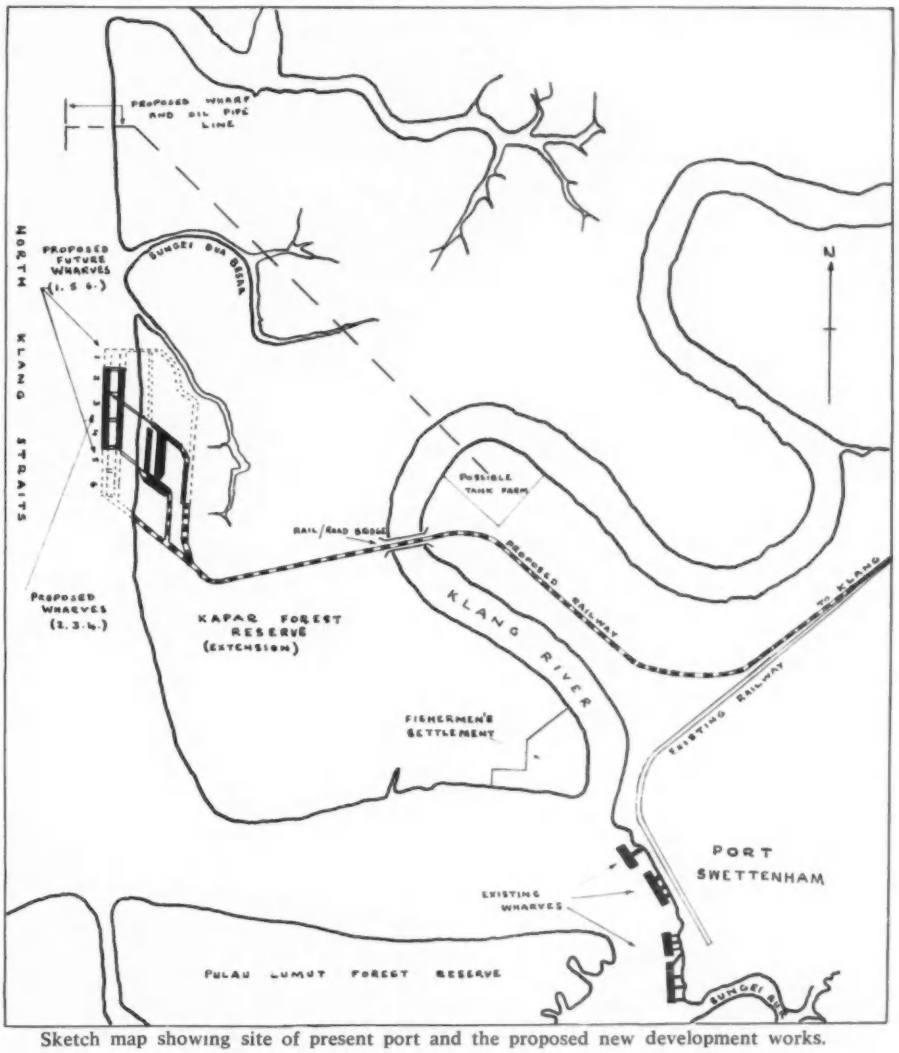
The Harbour Trade Union has consistently opposed any curtailment of overtime, although it has since complained that "the worker is compelled to augment his wages by selling his depleted energy, resting and sleeping time."

The Report condemns consistent overtime as a thoroughly bad habit which far from accelerating the flow of traffic, impedes the clearance of shipping. It therefore recommends that the port should in future operate on the basis of two eight-hour shifts, though provision should be made for a third shift in order to complete work on the controlling hatch of a ship on her last day in port. In any case, the present overtime practices should be brought to an end forthwith and, until a Port Agreement covering shift working is established by the Joint Council, the provisions of Clause 11 of the Agreement of April, 1953, already referred to, should be operated.

DEVELOPMENT AT NORTH KLANG STRAITS

Commenting on the design and operation of the proposed new wharves at North Klang Straits the Report says that, apart from the inherent disadvantages (as compared with building new berths in the present port) of splitting the Administration into two sections some distance apart, the proposed extension is very well sited. Any organisational disadvantage will certainly be outweighed if the new port is well laid out and easily operated. At all costs, therefore, it is essential to avoid any repetition of certain unsatisfactory features of the working arrangements and layout of the present installations.

The Report suggests that the proposed layout of the new extension does not provide as fully as it should for the efficient carriage of goods to and from the port by



Sketch map showing site of present port and the proposed new development works.

Port Swettenham, Malaya—continued

both road and rail transport; nor is it as well designed from the point of view of wharf working of cargo as could be desired. There is therefore every likelihood of the same difficulties recurring at the new port as the old if careful consideration is not given to increased movement of cargo by road vehicles, and to the accesses needed for this traffic. Four comparatively small amendments to the plan are therefore proposed which, it is thought, would greatly improve the accessibility of the port, and at the same time achieve more efficient operation at the ships' side.

(1) There is need for the utmost flexibility of movement on the wharf apron in front of the sheds, and thus it is particularly important for the fullest use to be made of mobile equipment such as fork lift trucks and tow motors. To do this successfully the apron must be kept as clear as possible and it is suggested that one line of railway to receive cargo direct into rail wagons is all that is needed in front of the sheds. This railway line should be close enough to the coping stones on the wharf apron for the ships' derricks to plumb the railway wagons. With this arrangement, there should be no need for cargo handling cranes on the wharf apron: virtually all ships have adequate gear for discharge and loading.

(2) In order to ensure adequate access at the back of the sheds not only for rail wagons, but for road vehicles to park while delivering and loading, a wider apron than is at present proposed should be provided. It should carry two lines of railway, though to provide maximum manœuvring space for vehicles the second line should not be alongside the first; it might be right at the landward edge of the apron, provided there are adequate scissors crossing to link the two lines. The whole apron should be fully hard surfaced, with the rails countersunk so that lorries can use the same surface as the rail wagons. The accesses from the land should be sufficient to provide a two lane road as well as the railway track to and from the mainland.

(3) At present it is proposed to build three berths as part of an overall long-term plan for six berths; the final plan envisages one further berth to the north and two to the south of the three berths now to be built. When the time comes for further expansion, however, it would be extremely costly, and would cause great inconvenience to port working, if major construction of berths had to be undertaken in two separate parts of the port. It is therefore highly desirable to consider seriously the building of an extra berth at the north end of the port at this stage, when it would be cheaper to construct. This fourth berth could be an open berth, consisting of a wall and piling; there would be no need for the present to build a transit shed or even to deck the wharf apron. A comparatively small extra cost now might well mean considerable saving in the future, and when the time came to complete the work there would be much less disruption in the port.

(4) Regarding the provision of an oil jetty, the site originally favoured by the oil companies (close to the entrance to the present anchorage) and the site preferred by the the Port Authority (about a mile to the north of the North Klang Straits extension) were both inspected. The former site is considered quite unsuitable. Although it is realised that the cost of providing pipelines and other facilities will probably be considerably greater for the second site, preferred by the Port Authority, this is recommended as the more suitable location.

Access to Port of Antwerp

Proposed Improvements to the River Scheldt

The increase in the dimensions of ships, and in particular of oil tankers and bulk cargo carriers, has made it necessary for consideration to be given to the measures necessary to improve the river Scheldt so as to provide access for these large vessels to Antwerp. To assist them in their considerations, the Antwerp City Council have consulted Mr. L. Bonnet, Honorary Inspector-General of Public Works, an hydraulic engineer of international reputation whose work on tidal rivers is widely known. Mr. Bonnet's report, an account of which is given in this article, has been published by the Port of Antwerp. It is preceded by an interesting appreciation of the situation which gives rise to the need for the measures contemplated.

Taking a berth length in Antwerp as 100 m. in 1940, in 1944 it had increased to 150 m. In Hamburg there has been an increase from 120 m.—130 m. to, currently, 160 m.—200 m. As regards draft an increase from an average of 7 m. to 8.5 m. is indicated. Apart from naval architecture, other post-war developments of importance are the attempt to speed the turn-round of ships and increases in the cost of construction. It is, however, from the trend towards very much larger tanker and bulk cargo carriers that the major problems for Antwerp arise.

Although Antwerp's immediate market is limited (9,000,000 people) it has excellent, road, rail and canal communications with a much wider hinterland, Luxemburg, France and Switzerland, and through the Rhine Canal, Western Germany. There is a delicate balance between imports and exports. Vessels arriving via the Rhine Canal have regard to return cargoes, and it is significant that Antwerp has suffered a regression in general cargo arriving via the Rhine Canal and in particular in raw materials. To maintain the necessary balance Antwerp must be rendered accessible by large tankers and bulk oil carriers.

Since the war two new oil refineries have been established in Antwerp, S.I.B.P. and Esso and the B.P.R. and Albatross refineries have been enlarged. In addition there has been the development of an important petro-chemical industry. The followng table indicates the increase in imports of crude oil by sea.

CRUDE OIL IMPORTS BY SEA
(In tons of 1,000 kgs.)

1937	305,678	1953	2,828,670
1938	340,723	1954	3,140,315
1950	342,970	1955	4,557,849
1951	850,049	1956	5,060,679
1952	2,187,520		

Tanker arrivals have increased from 295 in 1951 with a tonnage of 1,511,850 B.N.T., to 731 in 1956 with a tonnage of 3,654,690 B.N.T. Tankers now represent about 10 per cent. of all maritime traffic in the port.

Imports of refined oils have also increased rapidly.

REFINED OIL IMPORTS
(In tons of 1,000 kgs.)

	By Sea	*By River and Canal*
1937	879,193	58,796
1938	920,559	82,232
1950	1,403,086	451,709
1951	1,713,423	630,041
1952	1,374,740	653,954
1953	1,049,397	657,125
1954	1,037,330	652,652
1955	1,181,078	845,701
1956	1,353,212	915,773

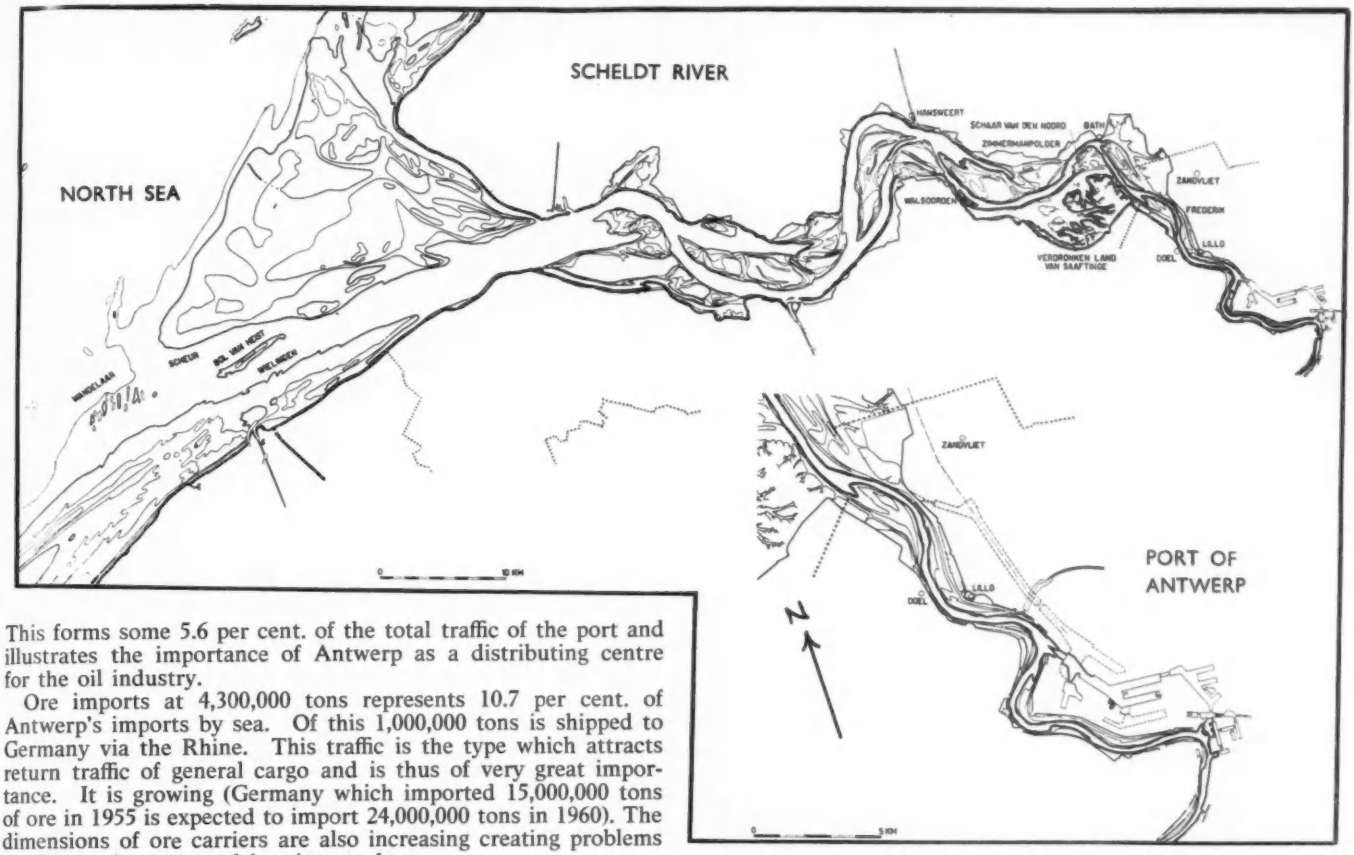
The export of oil products is important as is indicated by the following table.

EXPORTS OF OIL PRODUCTS
(In tons of 1,000 kgs.)

	International Traffic		Internal	Rail	Internal
	Rhine.	Rivers and Canals.	Waterways.	International.	
1937 ...	237,435	201,420	136,693	—	—
1938 ...	210,936	170,905	153,323	42,242	180,103
1950 ...	263,736	45,886	428,090	45,921	434,608
1951 ...	315,033	100,477	499,858	29,379	472,817
1952 ...	492,441	415,698	541,255	19,541	360,433
1953 ...	510,631	515,487	635,833	21,496	320,241
1954 ...	656,533	617,310	593,555	25,119	404,577
1955 ...	795,448	790,155	676,418	29,391	434,655
1956 ...	907,818	933,584	763,726	34,082	455,921

Of significance is the 900,000 tons exported via the Rhine and a further million tons via other rivers and canals, making a total of some 2,000,000 tons of international traffic in oil products. the matter by the Dutch Department of Building and Roads, a body certainly qualified in this field.

Access to Port of Antwerp—continued



This forms some 5.6 per cent. of the total traffic of the port and illustrates the importance of Antwerp as a distributing centre for the oil industry.

Ore imports at 4,300,000 tons represents 10.7 per cent. of Antwerp's imports by sea. Of this 1,000,000 tons is shipped to Germany via the Rhine. This traffic is the type which attracts return traffic of general cargo and is thus of very great importance. It is growing (Germany which imported 15,000,000 tons of ore in 1955 is expected to import 24,000,000 tons in 1960). The dimensions of ore carriers are also increasing creating problems similar to those created by giant tankers.

Antwerp has a ship repairing industry employing some 4,000 people. Two dry docks have been built by private enterprise and one by the municipality. This industry is sensitive to recession and its future will be affected by Antwerp's accessibility to large tankers and ore carriers.

As to the tendency towards larger ship dimensions, in 1953 nine ships over 10,000 B.N.T. entered the port of which two exceeded 15,000 B.N.T. In 1955, 90 ships 10,000 B.N.T.; in 1956—134 of which 9 exceeded 15,000 tons.

These, then, are the circumstances which have led the municipal authorities of Antwerp to consider, as a matter of urgency, the question of the navigability of the Scheldt by large vessels, such as ore carriers and oil tankers of up to 100,000 d.w. tons and this is the context within which Mr. L. Bonnet's report has been produced.

The report introduced by Mr. Bonnet was investigated by the technical services of the City and, with the help of interested port users, it was further perfected. Mr. Bonnet's first conclusion refers to Antwerp's ability now to receive ships up to 50,000 d.w. tons, on the condition that certain comparatively minor works are undertaken. These vessels would be berthed near Zandvliet, where, some 165 yards off the approach channel, along the Frederik-pass a jetty of 550—600 yards length would be constructed. This jetty would be provided with pipelines through which the oil would be pumped to the refineries.

Except for the construction of the jetty, some local dredging along the jetty pile supports and the diking of the haughs off Zandvliet—necessary in any event—no other works would be required.

It would however be advisable in order to extend the periods of transit, to dredge the eastern point of the shoal "Bol of Heyst," in the Wielingen channel from contour (−8.90) to contour (−9.50). Should this work be carried out, tankers of about 50,000 d.w. tons might even at neap tide and strong easterly winds, have as good transit conditions as ships of 35,000 d.w. tons, already entering the port.

With respect to difficulties resulting from fog, it is advisable to provide for additional anchorage; this could be done by adjusting the buoying near the "Schaar van Noord."

The planned establishment of meteorological stations at Hansweert, Bath and Doel and the setting up of a special service of river pilots will also largely contribute to the safe navigation of large tankers.

This very simple solution—requiring a maximum outlay of Bfr. 100,000,000 for the works to be carried out along the Scheldt river—has the drawback of requiring additional investments on the part of the petroleum refineries for the construction of pipelines. This handicap could be overcome by bringing forward the completion of the maritime canal, already included in the ten year plan for port extension, and by constructing at once the connecting maritime lock which is the natural outlet of the canal in the neighbourhood of Zandvliet.

Thus, not only super-tankers but also large size colliers and ore-carriers, could penetrate, via the aforementioned lock and canal, in the heart of the existing port apparatus with its petroleum docks and transhipment quays for bulk commodities.

This solution, which is anyway a requirement of the future, would reduce considerably the need for investments by the oil-refineries. In the second part of his report Mr. Bonnet deals with the general tidal regime of the river and the solutions studied in the past, in order to improve Scheldt navigation. The works which are important for the navigability of large tankers up to 100,000 d.w. tons, are analysed in more detail.

It is indeed surprising that in several competent quarters it seems to have been overlooked that for over a quarter of a century elaborate studies into the possibilities of extending the navigability of the Scheldt, have been published, and that the same plans afterwards have been tested out over more than seven years in the Hydraulic Laboratory. This careful, protracted, scientific study has moreover been confirmed, with respect to the ensuing possibilities, by the researches made into

The solution reached by the Dutch brings the results of the Belgian engineers to light. The Dutch proposals are however

Access to Port of Antwerp—continued

more extensive since they involve the cutting of the dangerous turn of Bath in the course of the normalisation, and consequently the dredging of a new approach channel.

The Belgian engineers do not venture to question the efficacy of the Dutch conceptions. Nevertheless they deem it unnecessary to go that far and want to eliminate, if possible, the risks inherent in this solution.

The Scheldt normalisation project, as appears from the foregoing, has not been conceived by way of an improvisation, occasioned by the very recent desirability to receive vessels up to 100,000 d.w. tons. Hence, the project has no provisional character—as is the case with many other projects of this kind—nor is it the result of a hasty investigation by an administrative commission. It is intended to be judged technically and economically without any parish-pump political ideas.

The only aim is the long desired improving of the tidal regime of the river. The possibilities created by the project for the navigation of large tankers, of 100,000 d.w. tons and over, are only a natural consequence thereof.

The works dealt with hereafter, furthermore proved their efficiency on prior occasions; e.g. with the normalisation of the Weser-river, the seaway of the port of Bremen, under the direction of the famous hydraulic engineer Franzius.

One of the basic principles of normalisation is that the river must have only one bed, which gradually narrows from the mouth in an upward direction, thus making a uniform funnel-shape. The depth also must have an even grade.

In the Scheldt river, south of Bath, off the drowned land of Saeftingen, a notable discontinuity exists which most certainly should be eliminated.

At this point the Scheldt is 6 miles wide between the dikes, whereas the normal width is only 1¼—1½ miles.

Near Hansweert, downstream, where the river has almost normal dimensions, it is 2¼ miles wide, and at Zandvliet, upstream approximately 1 mile.

In the area where the river suddenly widens, the average depth at half tide drops to 21—23-ft., against 29-ft. at Hansweert and 26-ft. 9-in. at Lillo.

This brief description outlines the large interruption existing between Walsoorden and Zandvliet, and gives an idea of the hydraulic power lost by overcoming the abnormal resistance of the river at this point. This wrongly used energy can be recovered by giving the river a normal width, gradually decreasing from 2¼ miles at Hansweert to approximately 1 mile at Zandvliet, and by increasing the depth, in such a way that the required deep approach channel for large tankers is obtained.

A similar project, tried out as to its general effect, in the Hydraulic Laboratory, indicates only an average depth of 23-ft. 6-in. at half tide, because the complete elimination of the shallows would increase the power of the tidal current to such an extent that considerable works would be required in the Belgian section of the Scheldt in order to master the stronger tidal current. Even now, it will be necessary—in order to compensate for the increased hydraulic energy and to avoid exceptional high water levels—to proceed with a certain widening of the riverbed at a small distance upstream of the planned normalisation. All this shows that the Scheldt river disposes of much more energy than deemed necessary by Mr. Bonnet, for the time being.

The approach channel in the normalised section between Bath and Zandvliet will have a width of 550 yards, whilst a depth for tankers reaching 46-ft. below low water, on the bars, and 49-ft. at other places is provided for.

The dikes are designed in such a way that of the two existing channels at Walsoorden only one remains; the coffer-dam at this spot also disappears. The dangerous gully near the Zimmermanpolder, which sends a strong lateral current against vessels navigating in the main channel, will also be eliminated by the Northern dike.

The difficult curve of Bath, thus improved, and having a larger radius, will allow vessels of great length to pass without tug assistance.

Besides the aforementioned difficulty at Bath, which might be eliminated by the normalisation of the river, there are two more hindrances in the way of large tankers navigating to the port of Antwerp. The first is located in the Wielingen pass.

On the bars of the channels "Wandelaar" and "Scheur" the depth is now only 31-ft. below low water. This depth must be increased to 39-ft. over a width of 330 yards if tankers of 100,000 d.w. tons have to be accommodated. Furthermore the approach channel must be properly buoyed and beaconed.

Because the river bed at this spot consists of a hard conglomerate soil (clay or shells) and the dredging of both bars would take place in the direction of the tidal current, there is no danger of silting, and consequently no need for dredging to keep open the channel.

When the dredged material is deposited along the northern border of the channel, and reinforced with a slope of stone-chippings, part of the currents now flowing over the "Shallow of Schooneveld," will then be driven through the channels "Wandelaar" and "Scheur" and this will increase the effect of the tides; thus the deepened channel will obtain a greater stability.

Bearing in mind that this work has a large scale, extending over 10 miles, it should be carried out in three phases (first up to level—34-ft., then up to level—37-ft., until finally level—39-ft. will be reached): these phases may be adapted to the growing dimensions of the tankers actually calling at Antwerp, in the course of the coming years.

Another hindrance is constituted by the Southern Hole (Zuidergat) which also must be dredged from approximately 33-ft. under low water to approx. 39-ft., over a length of 1¼ miles. On account of the importance of the aforedescribed works, it is undoubtedly interesting to learn a few details regarding the expenses involved and the financing possibilities of the undertaking.

In the first place it should be noted that, when judging these data, one must take into account the general improvement which will result from the outlined normalisations with respect to the safety of navigation to Antwerp. Hence, the financial outlook of the project made up for a seaport having a 40 million tons traffic, can hardly be compared to similar outlays for ports with far less tonnage or depending completely on tanker traffic.

Furthermore a considerable compensation arises from the reclaiming of several thousands of acres of farmland, which will follow the construction of dikes included in the normalisation plan.

With regard to the interest taken by Holland on numerous occasions in land reclaiming works and acquisitions of agricultural soil, it would not seem bold to expect some aid from this side.

By the construction of several new dikes, a considerable part of the investments, provided for in the Dutch Delta Plan with respect to the heightening of dikes along the Wester-Scheldt, will be cancelled, so that a compensation may normally be expected.

On the other hand it is worth indicating that the execution of the normalisation project will put an end to the expensive dredging works on Dutch territory, which now yearly require large financial outlays.

According to the calculations of Mr. Bonnet, each year Bfr. 100,000,000 would be saved.

Under these circumstances it can be anticipated that the reclaimed land and the savings on dike heightening, combined with the reduction of the maintenance dredging expenses will make it recuperate quite quickly the outlay involved in the normalisation of the Scheldt and the excavation of the Wielingen-pass.

Besides the economic interest of the national port—Antwerp—the nation has also a direct financial interest in the rapid normalisation of the Scheldt river, even without taking the forthcoming operation of large tankers into account. The eliminating of a considerable part of dredging works alone justifies the plan.

It is our opinion that the foregoing amply proves that the Scheldt is still far from having reached its maximum capacity; it can be fully ascertained that this river has the required power to be adapted to the increasing size of tankers.

It would be astonishing if Belgium could not raise the necessary funds to normalise the access to the first national port, when it is moreover certain that such normalisation would enable it to receive the largest tankers afloat.

Reconstruction of North Pier, Oban

A New Form of Breastwork

(Specially Contributed)

AT Oban, Argyll, Scotland, there has been recently constructed an unorthodox and interesting new form of quay wall breastwork, which is described in this article.

This breastwork forms the major part of the reconstruction of the North Pier which is owned and operated by the Oban Town Council in accordance with the provisions of the Harbours, Piers and Ferries (Scotland) Act, 1937.

The North Pier is in fact a solid quay located on a promontory on the East shore of Oban Bay. The fetch to the Island of Kerrera at the other side of the Bay which shelters Oban from the Atlantic is 1¼ sea miles.

A swell passing up Kerrera Sound however enters the Bay and although normally of little trouble to shipping it is sometimes accompanied by a tide that rises 4-ft. or thereabouts above the level of M.H.W.S.T. Like other parts of the West Coast of Scotland, Oban experiences every 30 years or so a very high tide that rises to around 5-ft. above the level of M.H.W.S.T., and this does considerable damage to marine structures by reason of the fact that the swell which usually accompanies these exceptional tides subjects all open structures to considerable pressures acting upwards under the decks. Piers on the West Coast of Scotland have not only been stripped of their decking under these conditions, but in 1927 one pier at Bruichladdich Distillery, Islay, had all the piles supporting 100-ft. of its approach completely extracted.

Shipping using the North Pier Oban not only serves the needs of numerous islands but it is from the North Pier that Messrs. MacBrayne's Steamers carry tourists to and from Iona and Staffa (Fingal's Cave). Cargo vessels of around 1,500 tons displacement berth at the North Pier during all hours of the day and night, winter and summer, and often under difficult conditions of strong on-shore winds.

Geology of Site

The original North Pier had been formed on a slate rock outcrop, although this pier has been extended from time to time the rock still mounds up on a section taken along the berthing face. Over the greater part of this rock mound as viewed along the berth line there is sand and gravel overlying the rock but near both ends where the rock dips there is in front of the quay soft clay overlying the rock. At the North end the depth of clay does not exceed 6-ft. but here there are 14-ft. of gravel and sand overlying the clay. Only at the South end however, does this soft clay extend from the sea bed to near the rock surface.

Commencing at a point about 40-ft. from the South end the rock dips from the level of −33.0-ft. O.D. to −50.5-ft. O.D. at the extreme Southern end, and the clay overlying the rock in front of and under the quay at this end has an average shear value, under 500 lbs. per sq. ft. Judging by the 7-ft. runs some of the piles took under the weight of the hammer at this position some of the clay would appear to have a shear value considerably less than 500 lbs. per sq. ft.

Existing Works

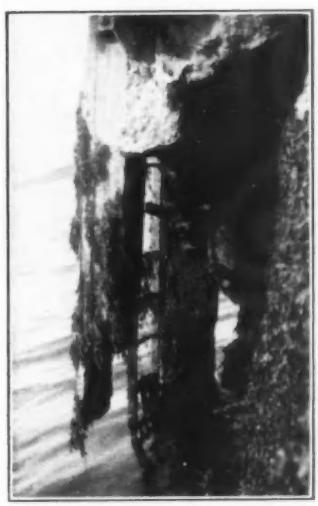
Before the reconstruction works were carried out the North Pier consisted of an encased and filled in timber wharf, the quay wall which retained the fill being of mass concrete and masonry. The face of the wall consisted of a 2-ft. 6-in. thickness of mass concrete encasing the front piles of the old wharf behind which there is located a slate wall, the slates at certain points being bonded dry, and at other parts being laid in concrete as a layer of displacers, the concrete being monolithic with the 2-ft. 6-in. face slab.

Over 40 years ago some R.C. sheet piles had been driven close into the toe of the wall to form an apron to retain concrete then placed in cavities formed under the wall, and to generally strengthen the structure.

Viewed from across the Bay that section of the quay wall now provided with a relieving platform appeared to have a different colour and on close inspection appeared to be of a later date than the rest of the wall. The batter of this section of the wall was 1 in 5 while the remainder and greater part of the quay wall had a batter of 1 in 8½ and a screwed or twisted section of wall joined the walls of different batters.

The wall was fendered with 12-in. x 12-in. upright logs, spaced at intervals which varied from 6 to 12-ft. and each provided with 12-in. x 6-in. timber rubbing pieces.

By the end of 1953 the structure was in a dilapidated condition and in need of major repairs or reconstruction, and was



Photograph showing the condition of the wall at the south end of the quay where part of the face of the wall was levered off due to relative movement of wall and ground.

View showing top of steel piling, H piles and suspender bar. The timber shown wired to the piles is to form a step against which to tighten the vertical shuttering.

giving Oban Town Council grounds for concern. A soil survey, together with a detailed inspection above and below water, also the sinking of trial pits behind the quay wall, and reference to certain levels taken 7 years previously revealed the following defects:—

(1) A ground mass slip circle failure was taking place in two directions at the South end.

(2) The wall was settling at and near the South end.

(3) The quay return wall at the boat slip at the South end was severely cracked on diagonal lines, some of these cracks were 3-in. wide and pointed upwards to the left as viewed from the boat slip, and did in fact point roughly towards the centre of rotation of the slip circle.

(4) The wall retaining the fill of the boat slip was bulging outwards due to the downward movement of the South return wall and the decking of the boat slip dipped towards the South return wall.

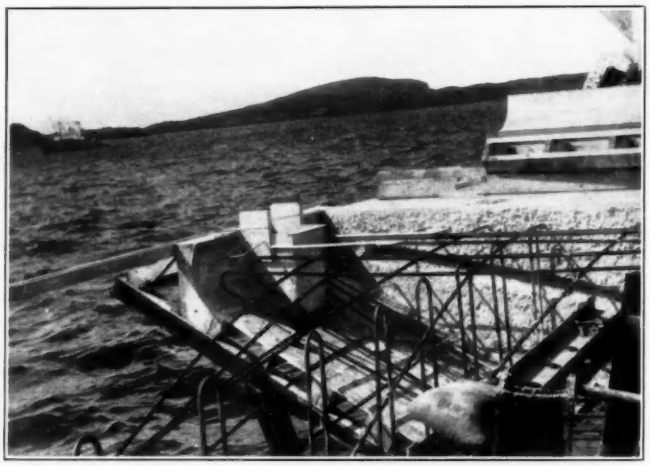
(5) The structure was undermined for the greater part of its length to the extent of about 2-ft. average but at three points there were cavities 9-ft. deep.

(6) The low level concrete at the South end was shattered and a large part of this wall did in fact fall out between the time the new work was approved and tenders invited. This partial collapse took place due to a greenheart timber pile embedded in the concrete facing being flexed due to the relative movement of ground and wall. On inspection this greenheart pile looked

Reconstruction of North Pier, Oban—continued

remarkably new as if it had been driven to support concrete repairing previous collapses.

(7) The wall was too far decayed over the greater part of its face to hold fender fixings securely. The face was so decayed in fact that some of the original face piles of the old timber wharf could be seen through holes in the face of the wall, and at other points all that could be seen was the cavity left by the old piles long since decayed. From the diver's suit some of these much decayed piles of the old wharf could be seen where they passed through the cavities undermining the wall. Some of these piles



Two views showing the cantilever under construction.

were decayed completely through.

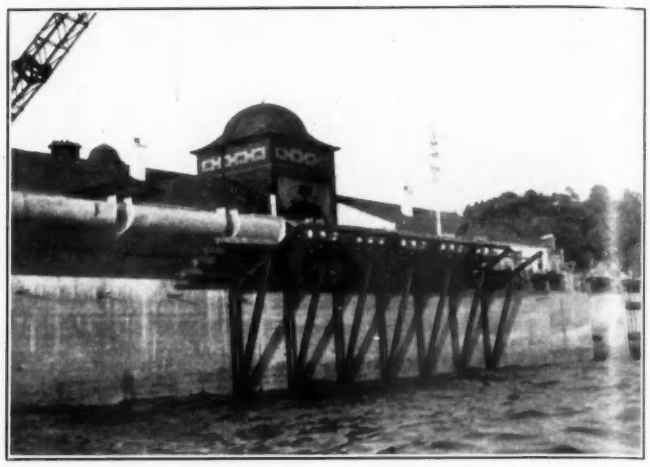
(8) The batter of the fender piles at the South end being 1 in 5 (the result of the long term ground mass failure) was a danger to the propellers of twin screw vessels and while the survey was being carried out a vessel's propeller did in fact gouge out a fender but luckily between fixings.

(9) The deck surface had settled in places, had insufficient falls generally and in consequence was a mass of puddles after rain.

(10) An old timber hulk called the "B. C. Bailey" had been sunk in 1848, to form the screen behind an extension then carried out to the old wharf in a southerly direction. Unfortunately this vessel had not been well stowed with filling and as its deck structure collapsed, cavities had been formed from time to time in the pier deck and floor of the pier building.

(11) The cope level of the quay was too low and required rather high fenders to prevent vessels' beltings passing over them and being trapped.

(12) There were insufficient bollards and the sponson fenders were used as mooring posts.



View of breastwork before driving the fender piles.

(13) The filling behind the quay wall consisted mainly of a dirty coarse sand.

Notwithstanding the above defects Oban Town Council have had good service out of this encased wharf and it was decided by the Engineer that if at all possible the reconstructed quay should be no less durable.

Functions of the New Works

The new breastwork in addition to arresting the circular slip ground mass movement and settlement of the wall at the south end has been designed to meet the following requirements at the minimum cost:—

(1) To fill all holes in existing walls with concrete.

(2) To strengthen the existing structure generally, and provide an anchorage to supersede that provided by the timber cross ties of the old wharf which are now considerably decayed.

(3) To avoid loading the soft ground in front of the wall between the new and old work and all the associated settlement troubles likely to arise if downward forces were added to the face of the old structure.

(4) To avoid serious uplift to the structure from wave action.

(5) To obtain a small increase of depth of water without having the services of a dredger.

(6) To accommodate spring fendering.

(7) To provide as quiet a berth as possible.

(8) To eliminate water being splashed on to the ships as took place with fenders fixed directly to the old wall.

View of completed pier.

Reconstruction of North Pier, Oban — continued

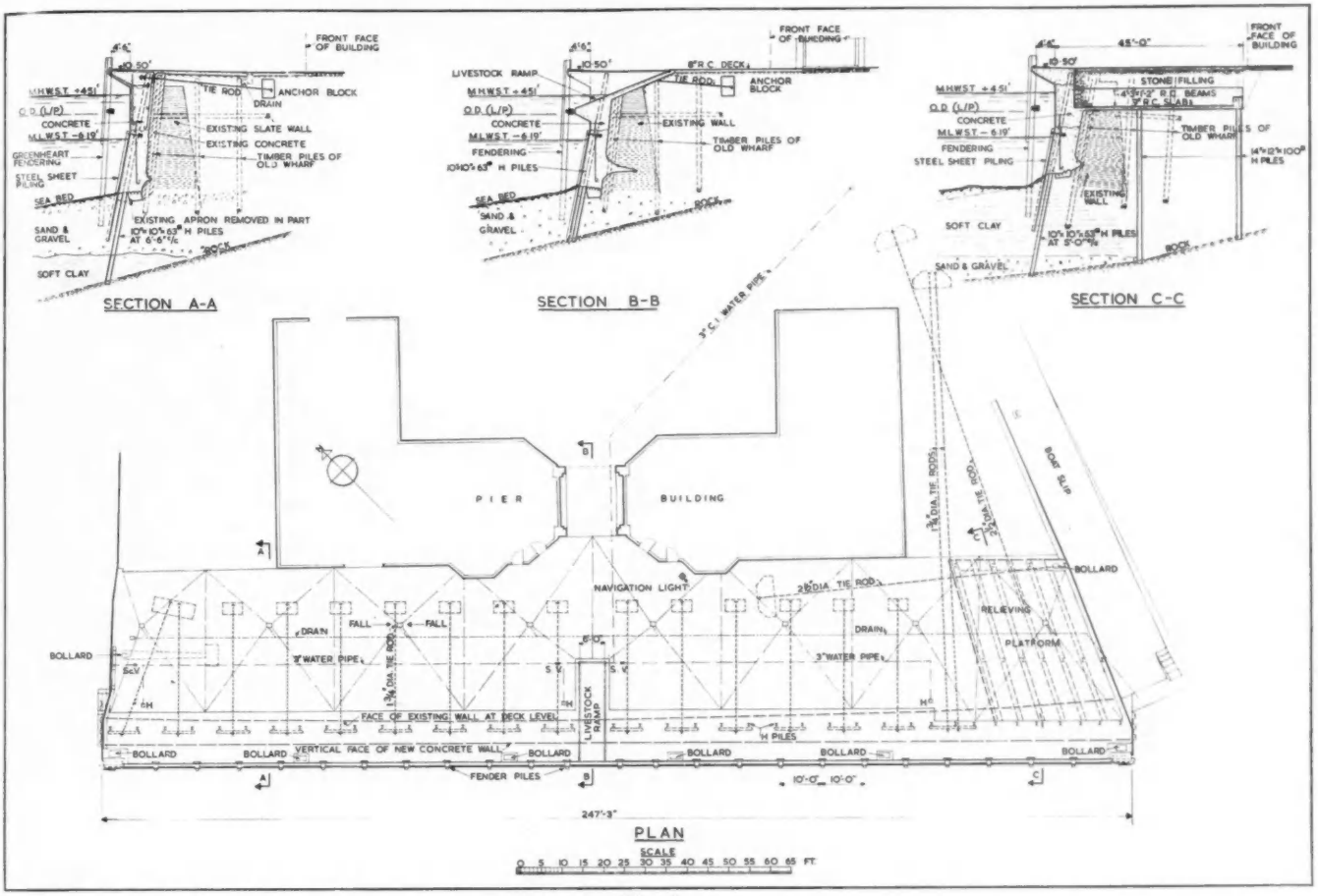


Fig. 1.

(9) To avoid fishing boats being caught under the deck of the structure.

(10) To provide a structure of high durability.

(11) To avoid having to construct anchorages within or behind the pier building.

(12) To avoid as much as possible the removal of the apron and concrete sheet piles located at the base of the old wall.

(13) To have a pleasing appearance as would befit a holiday resort having an extensive and high class tourist industry.

(14) To reduce to a minimum the vibration caused by pile driving down the face of the existing wall.

(15) To restrict as little as possible the free flow of water under the quay.

Description of New Work

The general arrangement of the works are shown in Fig. 1 and the typical cross section of the breastwork is shown on section A-A of this figure.

The new works could be described as a self-anchoring, semi-mass concrete facing wall, supported on raking broad flange beam piles. The steel sheet piling serves to secure the wall against sliding and of course provides the necessary support for the concrete filling the cavities in the old mass concrete wall.

It is known that steel sheet piling in clear sea water as exists in Oban Bay will be protected by the formation of barnacles from the cut off level selected down to sea-bed level.

A simple system of all greenheart pile fendering consisting of piles at 10-ft. centres bolted to a 14-in. x 14-in. waling is provided. Each pile is supported in a steel-lined pocket in the deck by means of a length of Goodyear fender rubber of the rectangular type. All broad flange beam piles are provided with seatings welded between flanges mainly before driving, and after driving were provided with a saddle over which a heavy splayed hairpin suspender was fixed to carry the concrete placed between the sheet piles and old wall and in this way take full advantage of the weight of concrete and prevent load coming on the soft ground in front of the wall and waste the passive resistance of the soil in front of the wall.

The deck surface is arranged to drain backwards from the quay face to allow for:—

(a) raising the cope level without raising the level of the shed floor, and

(b) to cater for any minor settlement of the decking at a later date.

Constructional Procedure

The constructional procedure for which the breastwork was designed and later constructed is very straightforward. The main features of the method adopted are as follows:—

(1) After anchoring the steel sheet piles by means of twin channel walings fixed to the anchored H piles, the concrete was placed between the sheet piles and the old wall by means of a tremie.

(2) The vertical faced concrete wall above sheet pile level was cast ahead of the rising tide in one continuous lift to its full height of 10-ft. 7-in., in lengths of 26-ft.

(3) The cantilever section was cast full depth in one operation, the shuttering for which was supported off the step formed at the head of the steel sheet piling, by all-welded steel frames consisting of twin 4-in. x 2-in. channels having a 4-in. x 3-in. timber flitched between same. These frames located mainly at 6-ft. 6-in. centres were fixed to the vertical faced wall each by means of a single $1\frac{1}{4}$-in. dia. bolt passing between the channels of the prefabricated frames and anchored to the H piles. By having these fixings near the tops of the vertically faced section

(Continued at foot of following page)

Port Supervisory Staff

The Need for Adequate Training

(Specially Contributed)

The high hopes held out by a few enthusiasts in 1945 that a complete mechanisation of the processes of loading, discharge and the transit of ships' cargoes was on the way have not, it must be admitted, yet been realised. Whilst in ports such as Toronto and St. John the quay work is now almost entirely done by mechanical means, this cannot be generally matched elsewhere. A few painful inches gained represents the sum of the accomplishments for which the majority of ports can take credit. In one place there is a shed entirely mechanised, elsewhere a master stevedore is using up-to-date equipment, an occasional commodity is now being housed by machinery instead of manually — the isolated examples that can be picked out serve to throw into relief the large areas where " as things have been, they remain."

Mechanisation on the quay, it has been claimed, has made greater strides than within the ship, although a survey of the world's ports to determine the relative rates of progress would hardly be practicable. Against the changes that forward looking port authorities and other port employers have been able to make, must be placed certain radical, almost functional changes in ship purpose and design. The forklift truck and the mobile crane on the quay have been countered by palletised cargo and packaged timber, the container ship, the universal bulk carrier and the roll-on, roll-off vessels. In addition there have been greatly improved winches, deck cranes and even overhead hold travellers. Whilst these revolutionary changes mark the highlights in the two main transportation links—the ship and the quay—it remains that throughout mechanisation is still something of an exception. There is still a long way to go before the turnround of ships in port can take full advantage of modern methods. For years this country led the world in the " know how " of cargo handling. Today, too many of these improvements have come from overseas.

An attempt to probe the causes of this rather disappointing record is well worth making. They are many and various. Two wars, and the necessity of paying for them, has been urged to explain the preference in many places for established customs. The United States had to adapt their shipping to the island warfare of the Pacific, hence the remarkable run of equipment they invented under that stimulus; this is given as another reason for America forging ahead. Labour over here has not always shown enthusiasm for new methods that appear to threaten the livelihood of the older and less adaptable workers. Port authorities have, in the main, inherited from their predecessors premises unsuited to mechanisation; only in those ports where war time destruction presented a unique opportunity has it been possible to operate in premises built especially for mechanical equipment. The cost of obtaining and maintaining a fleet of machines, whatever form this may take, is too large for small ports to face, neither have they the resources that would justify costly experiment. Tonnages handled are insufficient and much of this is seasonal; equipment bought would be idle for much of the time. There is little evidence, so it is claimed, that manufacturers of equipment have yet realised the peculiar problems that ports have to face. When they make machines that will do the work, then, say some operators, we shall certainly go ahead and use them. In other ports there is such a diversion of responsibility for the work that the through mechanisation of transit processes calls for more co-operation than could, in reason, be expected from the varying interests involved. Port and mercantile customs demand detailed handling of commodities in such a way that mechanisation is impracticable.

All these reasons are sound and have been invoked in varying degree in ports where a high proportion of the work still follows the pre-war pattern. There are even instances where mechanisation would not improve outputs and where reasons of politics and population have combined to discourage such attempts as have been made.

There is one reason which does merit a close examination in order to ascertain how far it can be held responsible for the slow rate of post-war mechanisation and the extent to which the disability that follows from it can be removed. The experience of active and energetic salesmen from equipment firms who have endeavoured to introduce their products into the ports, points to the need for a change in the mental outlook of many of the potential users of mechanical equipment. The courteous interest initially shown in the product is said to wilt as the powers of the new equipment are demonstrated; the growing realisation of the radical changes in gangs and manning that must be made before the work can be done mechanically is often enough to kill any remaining enthusiasm and the salesman leaves with a promise that " we will think it over." It is understandable that the difficulties may seem insuperable and the prize only too often not worth the dislocation of a system that has for long been satisfactory. The system has hitherto sufficed, and the employer and his staff are often without the experience of new methods that they feel they should have before they embark on an uncharted sea.

Whilst comparatively few executives can forge ahead and master, within a few intense years of study and experiment, the principles of mechanisation, it remains a truism that until the lower strata of operative personnel are converted to the principle, and instructed in the practice, of mechanisation, the impetus to improvement will soon flag. Interest and ideas must come from the bottom as well as from the top. It is not the originators of new schemes that normally have to solve the day by day problems that the man on the spot can envisage. Not only is there the feeling that new methods will bring a multitude of new problems but there is, through a lack of training, an understandable doubt as to their ability to solve them. The closer one is to the possible sources of friction the larger these tend to loom.

How can this attitude to mechanisation be overcome? A thorough training in modern methods would entirely alter the present outlook. It would stimulate the technical pride in his work that every port operator, whatever his grade, now possesses, and which is one of the greatest assets of the industry. Familiarity would remove the nascent fear of the unusual and the dislike of innovation. It would replace these with the natural desire to make similar experiments on a man's own territory. He would want to adapt the machinery he has seen at work, to the requirements of his own commodities and operations.

Starting with the training of the foremen grade—the staff on whom the success of new working must ultimately rest — it is essential that they be given opportunities to see what is going on elsewhere in their own port. Far too much of their time is perforce spent in the confines of the ship they are working or the shed or warehouse for which they are responsible. Far too much of the work of a port is done behind a row of iron curtains. The ship foreman generally knows little of the transit processes

Reconstruction of North Pier, Oban

(Continued from previous page)

of the wall it was a simple matter to handle and fix these at any state of the tide, it only being necessary to place the bearer on top of the sheet piles under the lower ends of the frames and to wedge tight at low tide before concreting the cantilever.

No movement of any of the shuttering took place and the line level and finish produced by using these frames and tongued and grooved shuttering are excellent.

Conclusion

In conclusion it could be said that the design lent itself to rapid construction; the Contractors, Messrs. William Tawse, Angusfield, Aberdeen, completed the reconstruction works in a very orderly fashion within 12 months of being awarded the contract.

The new breastwork provides a quieter berth than did the old quay wall.

The quay has been widened no less than 12-ft. without the use of temporary staging or heavy plant.

It is believed that a very durable structure has been provided for the expenditure of £51,000. The work was sponsored by the department of Agriculture for Scotland, and was carried out to the design and under the supervision of Mr. A. M. Robertson, M.I.C.E., A.M.Inst.Struct.E., Consulting Engineer, Glasgow.

Port Supervisory Staff—continued

that await the goods he lands; he knows less about the complex warehousing treatment to which specialised cargoes are subject. It would not be etiquette for him to take too close an interest in the other man's job. It might even be resented. He may be aware that experiments in mechanisation are taking place elsewhere in the dock or in the port and that these may ultimately affect his work. It is often sufficient that these are going on " on the other side of the road " for them to be shrugged off as not being his business.

However difficult it may be to release staff of this kind from their very necessary duties, the time and the money will be well spent if they are able to ponder on the new ideas they have seen and to reflect on the comparative ease with which difficulties, similar to those they would expect to have to face, have been surmounted. Educational visits with this object need not be limited to the home port. There are adjacent ports where progress may be well worth inspecting and with whose management reciprocal visits can be arranged.

The excellent courses sponsored by the National Association of Port Employers at Burton Manor attract a fortunate sprinkling of staff. Apart from the factual content of the lectures, given by experts within the industry, there is the mingling together of men from a dozen different ports. With the exchange of ideas that the informal nature of the course encourages, there is born in each student the knowledge that his port does not necessarily provide the last word in methods and efficiency. Other ports have their own ideas and they are good ones and well worth talking about. It is often the first opportunity of extra-mural discussion that the man will have had; it may well be a humbling experience. An extension of the limited facilities at Burton Manor could not fail to repay, in interset and ideas, the money spent.

Within the port itself there should be provided opportunities for instruction by means of lectures, demonstrations and discussions. Tuition on the practical side should be undertaken by practical men who are able to explain and demonstrate their subject. " Let the new girl sit next to Nellie," which has been quoted as a summary of the training schemes in operation in many factories, is to make certain that the new entrant will get no more than the (unpaid) instructor can, or is prepared to, impart. It is unusual to find a foreman who combines the qualities of a good instructor with a complete knowledge of the work; even with good will, training left to a colleague must always be a haphazard process to be done as an extra duty. It is too often concluded that the instructor must know how to teach because he knows so well how to do.

With the next grade, that may be described by the generic term " traffic officer," making themselves familiar with activities outside the territory for which they are responsible should be an essential part of their training. Add to this, frequent opportunities to visit other ports and to be given time to talk " shop " to their opposite numbers. The near Continental ports are throbbing with ideas, methods and practices that will be new to men reared in United Kingdom ports. Conditions are fundamentally different as between locked and open ports. Antwerp, Rotterdam, Amsterdam, Hamburg are all nowadays within easy reach and the small outlay involved in a programme of reciprocal visits would prove an excellent investment in acquired knowledge, and an up-to-date outlook.

Is the technical press fully exploited by managements today ? Is it sufficient for copies of the standard journals to be circulated each month until at last they find a dusty home in a muniment store. In these journal are to be found pictures and descriptions of the latest equipment, some of which might be well worth considering for local use. Surely a monthly, or even a quarterly, meeting of junior officers, sponsored by a higher executive, could profitably examine and discuss the latest additions to the mechanical range and the improvements in loading and discharge that have been covered in the period. There are few things at which an experienced officer more excels than the Discussion Group, where he can advance his views and marshall his arguments before his peers.

Many firms pride themselves on running a democratic scheme for official suggestions, giving monetary prizes for the occasional one that the management adopt. It is a fact however, that very many suggestions, made in complete sincerity, are impracticable of adoption because of the lack of a wider knowledge by the suggester. He may, for instance, know nothing of the policy complications that would follow the adoption of his " good idea." Only too often he is without the requisite knowledge of the capabilities of mechanical equipment and the principles that govern its use. This is hardly surprising considering the severely restricted opportunities he will have had of acquiring this. Would it not be a practical idea to offer prizes, not for the unsolicited suggestion that hits the target, but for the best solution to a problem set by the management ? If it is an instance of building new premises for the mechanised handling of cargo would professional etiquette be offended by the submission of roughly drawn designs from staff who felt competent and who wished to put their recently acquired knowledge to account ? Would it not be good for morale for a man to recognise that even minor ideas he had produced had been incorporated in a building that would be permanent ?

The higher executives have access to journals, discussions, papers submitted to technical societies and extensive opportunities to travel and to entertain visiting port executives. What they generally lack is the time to read more than a tithe of what is put before them. A monthly digest of the more pertinent publications, that would contain essential matter only, might well command the limited time that managers have for keeping abreast of events. To keep management ahead of events provides a more subtle form of training. Too often the changes in ship design and the methods of carrying cargo have been introduced with the port authority left out of the picture until it is too late for them to keep in step. Bulk sugar had to be handled with existing gear, improvised to meet the entirely new conditions. Container traffic has caused difficulties to terminal owners that could have been avoided had they foreseen the trend that was upon them.

A small committee of higher executive officers might well be charged to investigate for the benefit of the management the shape of things to come. There are indications of this to be found continually in press reports of impending changes in the fiscal policies of foreign countries, or in alterations to their geographical conditions. They might be asked to study and advise on the effect of the European Common Market on the handling facilities for which the port authority is responsible, or the forthcoming opening of the St. Lawrence Seaway. Whilst an examination of the terminal arrangements demanded by a submarine cargo carrier might be regarded at this stage as an academic exercise, the investigation would serve as a useful basis that could be corrected from time to time as more facts became available.

It would be difficult to find fault with the standard of technical accomplishment to be found in most ports. Goods are handled with despatch, and with care; pilferage is hardly a major problem. Speaking particularly of London, Mr. G. V. Tonge, chairman of the London Dock Labour Board, emphasised recently that the hourly output of the London docker, when he is working, is equal to that of any in the country or on the Continent. Competition between ports, however, has never been so keen as it is today; even without this competition the cost of living can be materially reduced by an improvement in the turnround of ships in port. It is a further instance of the good being the enemy of the best. It is not sufficient for the standard to be good. There are already ports, Toronto is one, with almost 100 per cent. mechanisation. If training can make our ports the best, then surely it is not good policy to neglect the opportunities, until such time as we are left behind in the race for traffic.

Dredging Programme for the Port of Melbourne

It was announced last month by the Melbourne Harbour Trust that work had commenced on a dredging programme which will provide depths in the port suitable for the largest tankers, passenger liners and cargo vessels expected to use the port in the next few years. The dredging will provide guaranteed depths of 37-ft. at low water in the channel from the Fawkner Beacon to Breakwater Pier, Williamstown and a depth alongside the pier of 39-ft.

New Light-Alloy Transit Shed at the Port of Antwerp

By Ir. R. von der CAPPELLEN

An article giving a general survey of the subjects discussed at the Third International Harbour Congress, which was held at Antwerp in June of this year, under the auspices of the Royal Flemish Institution of Engineers, was published in "The Dock and Harbour Authority" for July, 1958.

The articles reproduced below are abridgements of two of the papers presented at that Congress. In the next few issues of this journal we propose to publish further articles based on a selection of those Congress papers which are most likely to be of interest to our readers.

With a view to reducing the turn-round time of cargo vessels, a very large transit shed has been built at Antwerp by the Compagnie Belge de Chemins de Fer et d'Entreprises for the Compagnie Maritime Belge. The shed was required to provide facilities for the loading and unloading of complete cargoes composed mainly of general merchandise varying greatly both in respect of the nature and the packaging of the goods.

The shed, which serves two shipping lines, is a single-span structure of advanced design, 250 m. in length and 80 m. in width. These were considered to be favourable dimensions for dealing simultaneously with two vessels occupying a 320 m. length of quay, bearing in mind that plenty of free space must be provided inside the shed to permit efficient and rapid operation of the mobile mechanical handling appliances employed (cranes and fork-lift trucks). The exceptional size of the shed was further justified by the need for an unusually large capacity for storage under cover of goods awaiting shipment. It was considered essential to reduce to a minimum the number of internal supports, and in the solution adopted these have been dispensed with altogether. The shed consists of a vast single bay spanned by lattice-type portal frames spaced 20 m. apart.

Structural Design Features

The only loads acting on the structure are those due to wind and snow and are not particularly severe. In conjunction with the use of aluminium alloy as the principal structural material it has thus been possible considerably to reduce the dead weight and, by employing long spans, to achieve an overall cost which was less than that of a comparable building of conventional design.

The building is founded on 446 Franki piles. About half of these are tension piles. This is due to the low dead weight of the structure (12 kg/m²), in consequence of which the overturning effect of wind load is relatively more important than in the case of a heavier form of construction.

The structural framework combines the use of steel and aluminium. It is provided with six expansion joints permitting temperature movements and comprises twelve two-pinned portal frames spaced at 20 m. centres in the longitudinal direction of the building. Light lattice-type purlins are supported on these frames and carry the aluminium roofing.

Aluminium alloy has been used for the structural framework generally (purlins, wind-bracing, roofing, etc.). The stanchions of the portals, the eaves girders with the adjacent purlins and wind-bracing, the framing of the wall panels, and the framework of the gable-ends are of steel construction, however. The steel components are all located at the periphery of the building, where their dead weight has little effect on the stresses in the spanning members.

Fig. 1. Cross-section of shed.

It was more economical to use steel for these severely stressed parts of the framework, where the numerous structural connections and the large sections required would have made the use of aluminium too expensive.

The roof slopes, which have a pitch of 16° in relation to the horizontal, are covered with 1 m. thick corrugated aluminium sheeting spanning a distance of 1.673 m. between purlins. The sheets overlap one another by an amount of 0.215 m. in the direction of the slope and by 1½ corrugations on either side. They are supported on the laterally inclined top flanges of the upper chords of the purlins, except in the case of the last two purlins, on each side of the roof, which are of steel and are surmounted by timber strips providing appropriately sloped seatings for the roofing sheets. The sheets are fixed by means of U-shaped aluminium stirrups which pass round the upper chord of the purlin. Four expansion joints are provided in the roofing.

Aluminium as a Structural Material

The structural properties of pure aluminium are far inferior to those of mild steel. They can, however, be greatly improved by the addition of alloying ingredients in conjunction with appropriate heat treatment. Thus, the addition of copper or zinc considerably increases the strength, but these alloys of aluminium suffer from the drawback of being susceptible to intercrystalline corrosion, besides being very expensive. The alloy used for the construction of the new shed at Antwerp is referred to as SIDAL 61c and contains about 1 per cent. of silicon and magnesium, together with a small amount of manganese or chromium for improving the mechanical properties and corrosion resistance of the metal. It is subjected to a special heat treatm nt process involving preheating, quench g and subsequent reheating. It has a m nimum yield strength of 26 kg/mm² and a m nimum ultimate strength of 32 kg/mm². The strength of this alloy is therefore of the same order of magnitude as that f mild steel. Its modulus of elasticity is lo , however, being only about one-third of that of steel.

The greater deformability of alu inium alloys in comparison with steel (on account of their low modulus of elasticity) render them more susceptible to elastic instability phenomena. In order to be able to use high working stresses in the metal it is therefore necessary to employ structural members having a low slenderness ratio. This explains why the aluminium framework presents a denser or more "spidery" appearance than does a comparable steel framework. In the aluminium structure the object is to achieve as uniform as possible a distribution of the material. In order to eliminate the danger of local instability without unduly reducing the permissible working stresses, extruded special sections provided with bulbs or thickened portions at the ends of the flanges and with large fillets at re-entrant angles are employed.

In the construction of the shed riveted or bolted connections were used for joints required to transmit large forces. The holes for the rivets or bolts were first drilled and subsquently rebored to the correct diameter. Rivets were made from rods having the same chemical composition as the structural metal of the framework, the heads being cold-formed by percussion. Bolting was employed chiefly for the purpose of erection of the shop-fabricated units on the site. All bolts, nuts and washers were cadmium-coated or metallised as a precaution against corrosion.

Joints having to transmit fairly small forces were formed by welding. The heat applied in welding the metal causes a loss of strength which cannot be accurately assessed. This method of making structural connections could therefore be used only in cases where the working stresses in the components concerned were relatively low. Electric arc welding in a protective atmosphere of argon was employed; the positive electrode consisted of an aluminium welding rod.

General Features of the Shed

Up to a height of 6 m. the external walls of the shed are constructed of brick so as to harmonise with existing adjacent buildings. The brick walling is surmounted by continuous vertical glazing mounted in a framework composed of precast concrete mem-

New Light Alloy Transit Shed—continued

bers. The external walls on the two sides of the building consists of a series of independent panels, 20 m. in length, enclosed in steel framing members which are fixed at their lower end to a beam mounted on pivoting bearings and at their upper end to the structural framework of the shed. They are thus able to follow the movements of the structure. The reinforced concrete portals enclosing the door openings, and the runner tracks for the sliding doors, likewise possess adequate freedom of movement.

Wide door openings providing sufficient headroom are necessary to ensure rapid entry and exit of cargo-handling vehicles. The front of the shed has 10 openings 6 m. x 6.20 m. in size, while six such openings are provided at the rear. Furthermore, there are three large door openings in each gable end, the central opening being 7.60 m. wide and 7 m. high, and the two side openings 6.40 m. wide. The openings are provided with steel sliding doors suspended from

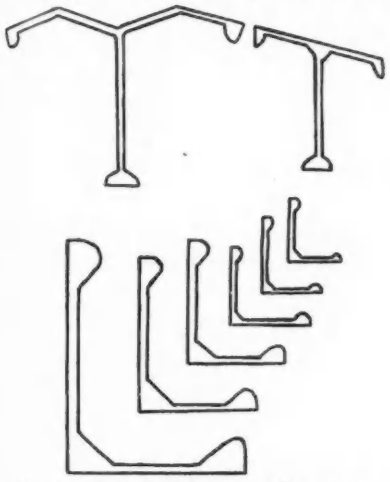


Fig. 2. Typical aluminium-alloy structural sections. The two upper sections formed the chords of the ridge purlins and of the ordinary purlins respectively.

runner tracks fixed to the inside of the shed wall. The lower edges of the leaves of the doors are fitted with concealed guide rollers.

Daylighting of the interior of the shed is ensured by twelve longitudinal strips of corrugated transparent plastic sheeting incorporated in the roof. Artificial lighting is provided by 20-watt fluorescent tubular lamps suspended from the purlins and mounted at a height of 14 m. above the floor of the shed, thus leaving ample headroom for mobile cranes. These lamps, of which there are 278 in the shed, give an illumination of 25 lux (2.3 foot-candles) at floor level.

The 42 m. wide apron in front of the shed contains four railway tracks and a set of quayside crane tracks. The passage of heavily loaded vehicles on these tracks sets up deformations which make it essential for the surrounding paving to possess some degree of flexibility. The nature of some cargoes, and the handling methods employed, moreover have a disruptive effect on the paving, necessitating its replacement from time to time. In addition, the paving

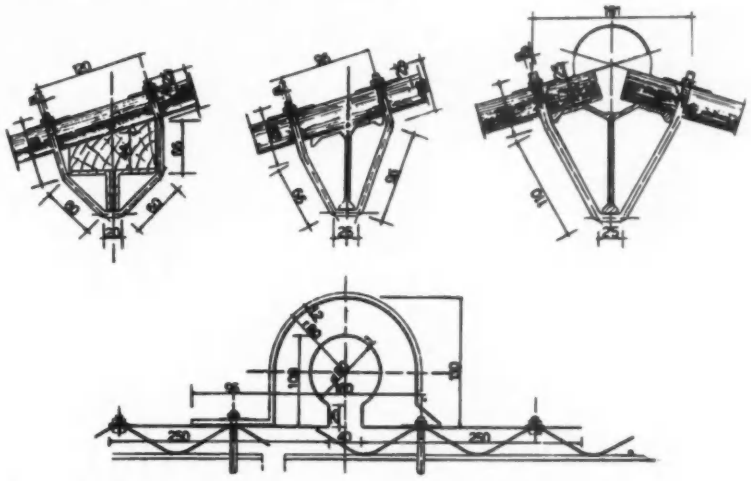


Fig. 3. Details of expansion joint and fastenings for roof sheeting.

should be so constituted as to permit convenient access (for the purpose of repairs, etc.) to the many underground mains and services in the apron. These considerations led to the adoption of two types of paving, namely, ordinary sett-paving and removable concrete slabs. The former was employed for the open-air storage areas on the apron and for the storage yards at either end of the shed. All other areas, including the internal floor space of the shed, were paved with slabs of such size and weight as to permit ease of handling (dimensions 2 m. by 2 m., thickness 10 cm.). These slabs, which are made of high-strength concrete with a wearing surface containing iron filings, are laid on a 10 cm. thick bed of sand. They are provided with top and bottom two-way reinforcement consisting of 6 mm. diameter bars; their edges are protected by angle-irons.

The new shed has had a marked effect on cargo-handling efficiency. Since it was put into service, the output per gang (17 men) and per shift has increased from 60 tons to 85 tons of general cargo loaded for export.

Banana Handling Facilities at the Port of Rouen

By R. GOUET

As the existing shed for bananas at the Port of Rouen had become inadequate for its purpose, it was decided to provide up-to-date facilities on a newly constructed quay in the northern part of the port. The design was made the subject of a competitive tender. The contract was finally awarded to the firm of Froment Clavier, who had submitted a design incorporating the use of reinforced concrete and prestressed concrete. Construction started in June 1957.

The scheme comprises installations for unloading the bananas from sea-going vessels by means of elevators, for sorting and storing them, and for despatching them inland, all of which operations have to be carried out at a temperature that is artificially maintained at approximately 13°C. In addition, it provides for adequate office accommodation, a large hall where stems which have prematurely ripened during the vovage are cut away, and ancillary facilities.

The installation has been designed for unloading vessels up to 135 m. in length; it is reckoned that a cargo of 1,500 tons can be discharged in eleven working hours. A storage capacity of 1,200 tons is provided. Despatch of the fruit by road and rail, at a rate of 100 tons per hour, begins while the vessel is being unloaded. About 70 per cent goes by road, and the remainder by rail.

The building has an area of 12,600 m² on plan and a total floor space of 14,800 m² (including upper floor), which is subdivided as follows:

Reception, sorting and storage (hall No. 1)	8440 m²
Despatch by rail (halls No. 2 and 3)	2020 m²
Despatch by road (eight lorry loading bays at each end of the building)	1420 m²
Offices and commercial hall ...	1670 m²
Cutting hall for ripe stems (on upper floor)	950 m²
Ancillary services (especially heating)	300 m²
Total	14,800 m²

The floor of hall No. 1 is elevated in relation to the general level of the quay in order to facilitate the loading of the bananas into lorries and railway wagons. A clear headroom of 5 m. is provided within this hall, the roof of which consists of nine northlight bays. The reason for adopting this form of roof construction is that it

Banana Handling at the Port of Rouen—continued

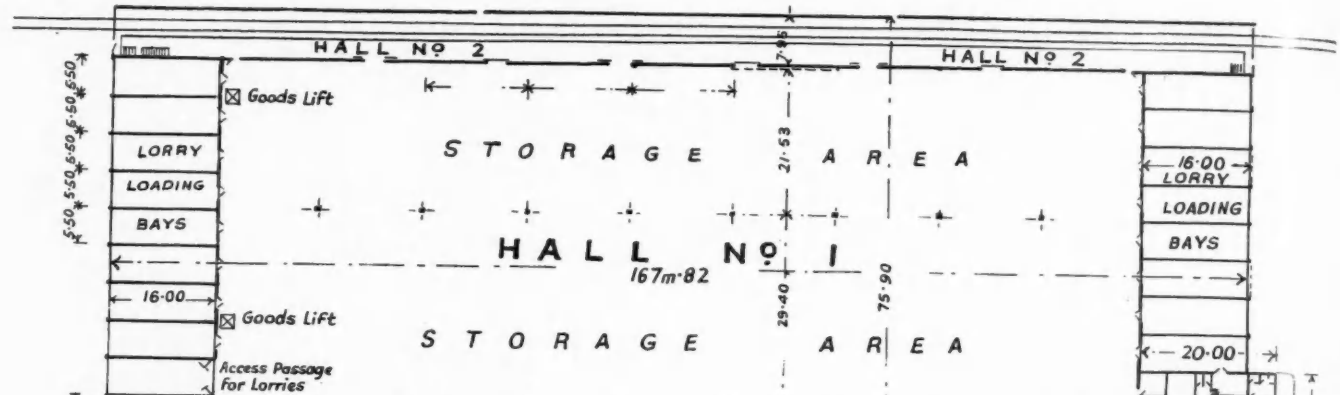


Fig 1. Plan of Ground Floor.

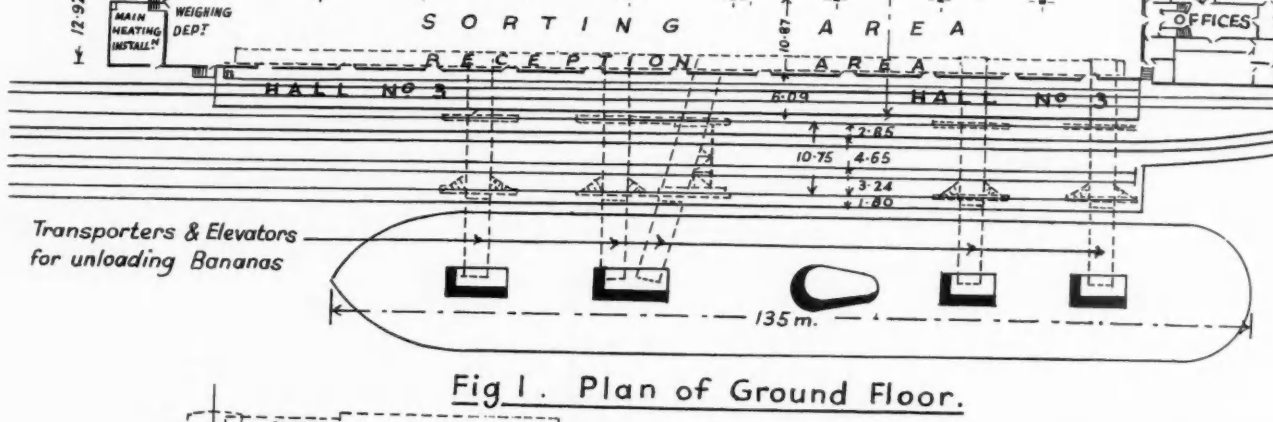


Fig. 2. Cross Section of the Building.

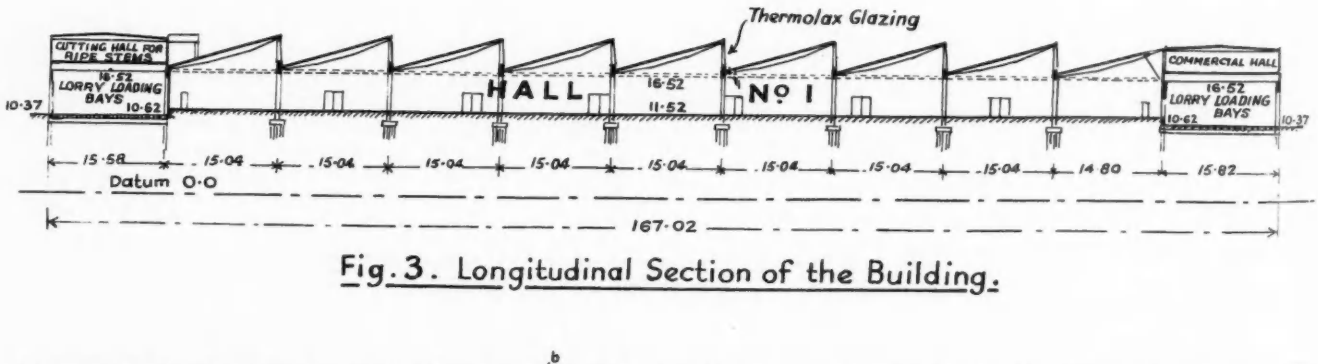


Fig. 3. Longitudinal Section of the Building.

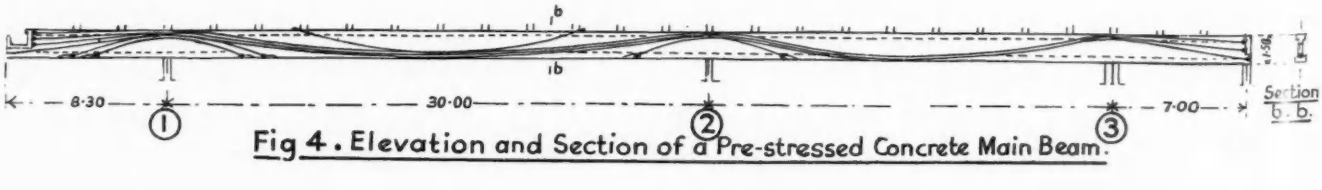


Fig 4. Elevation and Section of a Pre-stressed Concrete Main Beam.

Banana Handling at the Port of Rouen—continued

helps to keep the interior of the building cool in summer.

The building is supported on piled foundations. The piles, which are about 10 m. in length and 44.5 cm. in diameter, are arranged in groups of from one to four. They are of a special type (West's shell piling system) and are installed by driving into the ground a series of short pipe-like precast reinforced concrete shell units (1 m. in length, with an external diameter of 44.5 cm. and an internal diameter of 31.2 cm.) assembled into a continuous length on a temporary steel core. The driving blow is delivered mainly on to the core, which is provided with a precast concrete shoe; part of the energy is also transmitted to the shell units, which are thus carried along with the core into the ground. The pile is driven to a calculated "set" in the load-bearing stratum. The temporary core is then withdrawn, and the central cavity is filled with cast-in-situ reinforced concrete. A pile of this type and diameter has a safe working load of about 60 tons.

The halls No. 1 and 2 comprise nine bays 15.04 m. in width, separated by prestressed concrete main beams having an overall length of 67.30 m. These beams are continuous over three spans (of 7 m., 22 m. and 30 m. respectively) and are cantilevered a distance of 8.30 m. at one end. One of the columns under each beam forms a fixed support; the other columns are relatively flexible and act as movable supports.

The framework of the northlight roofs of these nine bays consists of precast prestressed concrete beams with a span of 15.50 m., which are supported at one end on the bottom flange of a main beam and at the other end on vertical posts which, in turn, rest on a main beam. These prestressed beams are spaced at 2.45 m. centres. The glazing is 3 m. in height.

Trough-shaped prestressed beams span between the cantilevered ends of the main beams (on the water side of the building) and form a gutter which at the same time serves as a walkway for the men who have to remove and replace the covers of the hatchways through which the bucket elevators of the banana unloaders are lowered into the building.

Hall No. 3, as well as the commercial hall and the cutting hall for ripe stems, are of reinforced concrete construction. The two latter halls have precast prestressed concrete roof beams spaced 2.45 m. apart and spanning a distance of 15 m.

Each of the halls No. 1, 2 and 3 is separated from the exterior and from the adjoining hall by a 30 cm. thick wall constructed of Siporex cellular lightweight concrete providing good thermal insulation. The partitions between the offices consist of two leaves made of hollow blocks enclosing a cavity filled with glass-wool ensuring acoustic insulation.

The roof is constructed generally of special reinforced ceramic roofing units provided with a concrete compression flange and spanning a distance of 2.45 m. (Minangoy-Poyet system). Where thermal insulation is required, viz., in the case of the halls No. 1 and 2, the roof is covered with a 6 cm. thick layer of expanded cork. The whole roof is rendered watertight by a bituminous covering surfaced with granulated slate. Flat portions of the roof are constructed in reinforced concrete covered with two courses of asphalt. Thermolux special glazing is provided in those parts of the building where heat insulation is essential. All doors are likewise thermally insulated where necessary.

As the temperature inside the building must be maintained at $13° \pm 1°C$. all the year round, the problem of heating and ventilation is of major importance. The heating installation, which has a capacity of 1,800,000 calories per hour, circulates hot water through 34 thermostatically controlled air heating units. In warm weather the building can be artificially cooled at night by supplying fresh air to the heating units; in the daytime the thermal insulation will keep the temperature down. The offices have their own central heating system.

The main flooring consists of a bituminous concrete surfacing laid on a quartzite macadam base. The building is equipped with a water supply system for cleaning purposes and a separate system for fire-fighting. Artificial lighting is provided by incandescent lamps.

The 67.30 m. long main beams are an interesting structural feature. As stated above, each of these beams has three spans —of 7 m., 22 m. and 30 m. respectively— and a cantilevered portion 8.30 m. in length. It has to carry a uniformly distributed load of 4.7 tons/m (including its own weight) and a concentrated load of 27 tons at the end of the cantilever. The beam has an asymmetrical I-section; the top flange is 57 cm. and the bottom flange is 70 cm. wide. It is prestressed by means of 14 Freyssinet cables, each composed of 12 wires of 7 mm. diameter. Six of the cables run the full length of the beam; four short cap cables are provided at the first support (at the cantilever end of the beam) and two at the intermediate support; in addition, two extra cables are installed in the long span of 30 m. The cables are tensioned, from both ends, to an initial stress of 123 kg/mm², which is estimated eventually to decrease to 102 kg/mm² due to the usual losses (creep and shrinkage of the concrete, relaxation of the steel). Friction will moreover cause a decrease in stress of about 35 kg/mm² from the ends to the centre of each of the continuous cables. The concrete has a specified strength of 400 kg/cm², the permissible compressive stress under working load being 112 kg/cm². No tension is allowed in the concrete.

The overall cost of the building inclusive of the heating plant and all ancillary equipment, is 28,000 French francs per m² of area on plan.

A Remedy for Dock Strikes

Correspondence on the Proposals by "Poseidon"

The article in our October issue, under the above title, in which "Poseidon" put forward suggestions for improving dock labour relations, has created considerable comment. The Editor has received a number of letters expounding a variety of views upon this important subject and the following is a selection from writers who have a wide experience of the port industry.

Sir,—May I refer to the article headed "A Remedy for Dock Strikes" appearing in the October issue of "The Dock and Harbour Authority."

Firstly, I would like to extend my congratulations to the writer and to say that the suggestions put forward are sound and convincing. Of these Number 3 subheaded "A Single Union" mentions that absorption or integration must be carried out by legislation and the sooner the better. These words I think offer very considerable scope for further thought covering a much wider field for the reason that legislation is one of the main causes of the present demoralizing pattern and present unrest which adversely reflects on our trade and economy.

The law today undoubtedly offers tremendous protection to the Trades Unions by placing certain privileges in their hands. These privileges, no doubt, were given to enable the workmen to bargain freely but it has also put the Unions in a position of great power. It may be helpful to give a brief summary of the extent of that privileged position and here I quote from the pamphlet "A Giant's Strength" published by the Inns of Court Conservative and Unionist Society, June 1958:

(i) Civil Conspiracy by an individual. Normally if two or more people with the intention of harming another person combine to do an act which, if done by one of them would be legal, they commit a civil wrong; but a similar combination by e.g. Union Members to do an act in contemplation of furtherance of a trade dispute is not a civil wrong (Trade Disputes Act, 1906).

A combination wilfully to damage a man in his trade is unlawful and a civil wrong unless the real and predominant purpose is to advance the lawful interests of those combining in a matter where they honestly believe that those interests would directly suffer if the action was not taken. This rule, which was laid down in the case of Crofter Hand Woven Harris Tweed Co. Ltd. v. Veitch is of assistance to Trade Unionists in cases where there is no trade dispute.

(ii) Inducing a breach of contract by an individual. Although if one person knowing of the existence of a Contract of Employ-

Correspondence—continued

ment between two other persons, and intending to injure one of them, induces or procures the other to break his Contract, he is civilly liable in damages. If he does the same thing in contemplation or furtherance of a trade dispute, he will not be liable (Trade Disputes Act, 1906).

(iii) Protection of Trade Unions for actions in Tort. Although any ordinary person or body may be liable for the civil wrongs done by its servants or agents, no such action may be brought against a Trade Union, its Members or its Officials in a representative capacity, in respect of any wrong committed by, or on behalf of, the Trade Union. This applies whether the civil wrong were committed in contemplation or furtherance of a trade dispute or not (Trade Disputes Act, 1906).

The above needs no explanation to emphasize the advantages the law offers to the Unions, but it may help to a fuller appreciation of the remarkable state we have arrived at by reminding ourselves of the statement made by Mr. S. Tribe, Market Organizer of Transport and General Workers' Union at Smithfield Market:

> " he said he would, the Judge said he could, we said he could not and he did not."

The pamphlet referred to above suggests a reform of Trade Union law for the reason that the Trade Unions have acquired a dominant position by the law and the recommendations inter alia are :

(i) That the present doubt as to whether a strike for a purely or predominantly political purpose is legal or not should be removed by the passing of a declaratory Act stating that such strikes are illegal.

(ii) That in future the privileges given to Trade Unions under the Trade Unions Act, 1871, and the privileges given to persons engaged in a trade dispute, whether Trade Unions or not, under the Acts of 1875, 1906 and 1913, should only be available to Trade Unions that have registered with the Registrar of Friendly Societies and to their Members acting as such.

(iii) That a strike in breach of Union Rules be illegal and that the Union or persons calling such a strike should lose the protection given by the various Acts to registered Trade Unions and their Members.

(iv) That the privileges mentioned above should not be available in the case of any strike unless it has been preceded by an enquiry by an independent Tribunal into the facts and issues of the dispute and a period of 14 days has elapsed between the date of the publication of the Report of that Tribunal and the calling of the strike.

It also recommends that where it is alleged that a restrictive practice is being operated by workmen, the question should be referred to a Court to decide whether such restrictive practice is justified in the public interest with the onus upon the workmen or Union of satisfying the Court that the restrictive practice is in the public interest. Also, as a matter of urgency, the Government and employers in consultation with the Unions should consider ways in which the workers' not unnatural fear of the short term effect of unemployment may be removed.

Further suggestion is that the Unions adopt a system whereby all inter Union disputes are referred to the T.U.C. Disputes Committee and to abide by the decision of that body.

Throughout my long experience of port working and administration, it has been brought more and more home to me the need of such legislation and I heartily applaud any reasonable attempt to drive this necessity home.

Ours is a democratic country and in a free society no private citizen should have the power to compel another private citizen to do something that he does not want to do. We have the right to strike but the individual who has different ideas to those of his associates should also have the right not to strike.

Felstead
Woodmancote, Sussex.
5th November, 1958.

Yours faithfully,
W. H. LAIT
Port Consultant.

Sir,—The author of the article in your October issue certainly hits one nail on the head. Unofficial dock strikes will continue in this country until some **fundamental** preventive action is taken. The point is: what action and by whom? The author suggests (a) reducing the number of employers to perhaps two per port; (b) giving employers direct control over labour; (c) reducing (by legislation if necessary) the number of unions to one; and (d) introducing a training scheme for dockers on similar lines to that of Rotterdam.

Let us be clear on two points: (1) whatever action is taken, it cannot be one which abolishes decasualisation and (2) there is no likelihood that any British Government would force any industry to have only one trade union. If these two statements are correct, we are left with suggestions (a) and (b) to deal with; (d) could (and should) follow the implementing of (b).

There can be no doubt that the multiplicity of employers competing for labour is an unfavourable factor in the port work of this country. The author's suggestion to reduce the number of separate employers is therefore a good one. If it is to be implemented, there must be either voluntary agreement or national legislation. It is probable that the latter would be necessary.

One implication of the proposal to give the employers direct control over labour is that the need to continue the National Dock Labour Scheme would have to be considered seriously. Whatever decision were made, steps should be taken to permit the re-establishing of discipline in the labour force. No change would be worth while if it did not offer this opportunity. Despite the pronouncement by Mr. Justice Devlin's Committee of Inquiry that " none of the grave unrest that has occurred can be put down to any provision on the scheme that has turned out to be unworkable," employers who have to accept the operation of the Scheme, know that, even when its disciplinary machinery works, it does not work effectively. When employers use it, they " go through the motions " knowing that, except in serious cases such as theft or assault, it will produce no noticeable result. There is so much to undo before the labour force can be organised rationally that it does seem that a completely new plan is essential.

It is easy to criticise without being constructive. Ways and means of remedying the position must be sought—but the first question is, by whom? The interests concerned include the Port Authorities, the shipowners, the National Dock Labour Board, the labour contractors and the Unions. Obviously the Labour Board will seek no fundamental change—and the Unions are satisfied with the Scheme as it is. The employers, of course, are not, but, before they put forward their proposals, which will undoubtedly involve the direct employment of labour, they will do well to give serious consideration to your contributor's proposal that a dramatic reduction must be made in their own numbers.

Yours faithfully,
20th October, 1958. " CARGO SUPERINTENDENT."

Sir,—I have read with considerable interest the article entitled " A Remedy for Dock Strikes " by Poseidon in your October issue and everybody with any knowledge of the dock industry must agree that until better employer/workman relationship is restored there will be no peace in dockland, despite what the Devlin Committee had to say on this point. I cannot, however, agree with the means by which Poseidon suggests this should be achieved.

Surely we have in effect one employer in London at the present time, namely the National Dock Labour Board, and is it not probable that this fact, resulting in the excessive mobility of labour, has contributed in no small measure to the unrest with which the industry has been bedevilled since the war. Poseidon is suggesting a duplication of this disadvantage by having a new statutory authority to control the public wharves.

Many years of experience in the dock industry have convinced me that the one way in which labour relations can be improved is to encourage the regular employment of dock workers by the same foreman under the same management as frequently as

Correspondence—continued

possible so that mutual trust and respect can be built up. Unrest rarely originates among a wharfinger's regular followers, but is most often introduced during busy periods by casual workers allocated by the National Dock Labour Board from other areas of the Port.

I submit that what is required in the dock industry in London is more active co-operation between the Unions and the employers and, above all, education of their members by the Unions so that the men honour agreements freely negotiated between the Employers and the Unions acting on the dock workers' behalf.

I would suggest, therefore, there is every reason to retain and encourage the regular employment of dockers by individual employers rather than by a corporate body, for it is only by working for an individual employer that a sound worker/employer relationship can be restored.

Apart from the foregoing, I feel that Poseidon is unfamiliar with the services the London wharves and warehouses are required to give and are designed to provide. What in fact may be "general cargo" to a stevedore discharging a ship in the docks becomes a special commodity requiring skilled and individual treatment when it arrives at a public wharf or warehouse. It is the wharfinger's careful study of the requirements of the various trades that has made London pre-eminent as a warehousing port. The individual wharfingers are far more capable of meeting the changing needs of these trades than would be the case if they were amalgamated into a corporate and impersonal whole.

This contention was substantiated by London's traders when in 1950 the London Chamber of Commerce was invited by the Docks and Inland Waterways Executive to comment on the functioning of the Port of London. On that occasion the Chamber recorded that in its opinion "these wharves had an intimate knowledge of the trades in which they specialised (and) were more flexible in meeting the changing needs of those trades than they would be if they were publicly owned."

In conclusion, I must contest Poseidon's observations that many wharves cannot be reconstructed for mechanisation. It might surprise him to know to what extent many wharves are mechanised, the only limiting factors being, firstly, the refusal of dock workers to accept further mechanisation with the reorganisation of work that mechanisation must obviously necessitate; and, secondly, the specialised requirements of the various trades, and the right of traders to demand delivery of any specific package at any given time, which limits the extent to which machines can usefully be employed in warehouses. For example, a pallet is useful only if delivery of an entire pallet load is required at one time and this is not the experience of my members.

The London Association of Public Wharfingers Ltd.
2nd November, 1958

Yours faithfully,
T. C. S. COPE,
Chairman.

Sir,—I have read with interest the article by "Poseidon" in your October issue. The avowed intention of the article is to stimulate discussion about the problems of the Docks Industry and this is a necessary pre-requisite of any reform. Old ways are deeply ingrained in the Docks and change will come only if there is a demand from a public which has been properly informed of the issues involved.

The writer falls into an error which is common—at least in London—that the rest of the country is to be judged by London standards. In fact, there are other substantial ports which have experienced comparatively little trouble in recent years. The remedy for weaknesses in the industrial set-up must to some degree be national, but it by no means follows that it should be a purely London prescription.

It will almost certainly be generally acceptable that there are too many employers, but again it does not follow that the cure is a single employer. Monopolies are, of course, tidier, but there are objections to them, especially from the customers. It was suggested at the end of the War that Port Authorities should administer the Dock Labour Scheme, but the Trade Unions opposed this and no action was taken. The most hopeful approach is for workers to be attached to fewer individual employers, as far as possible on a permanent basis. Employers may have to be compelled to do this, for the easy way is to draw from a pool, with no responsibility except for the levy, and even so the cost of the pool falls most heavily on the employer who offers the greatest regularity of work.

The integration of Trade Unions would almost certainly be a sound measure but there is not the remotest prospect of this being done by legislation. It is for the Unions to try and arrange it.

To promote the calibre and status of the labour force is an essential development, and a training scheme of some sort must come as a part of this. A modest training scheme was put forward years ago by the employers but has so far been resisted by the Trade Unions.

Finally, the Government must acknowledge that it has a moral and constitutional responsibility and must sometime discharge it, as did the New Zealand Government in not dissimilar circumstances.

Yours faithfully,
28th October, 1958. "ONLOOKER."

Sir,—The article in your October issue on a remedy for dock strikes is provocative, but none the less well informed and thoughtful.

Poseidon does not deceive himself that there is an administrative answer to every problem, and it is thought that even the measures he suggests would do little towards solving the problem of human behaviour in the dock industry.

The "pool" labourer is a frustrated man. He is treated as a labour unit by the N.D.L.B. This cannot satisfy a good worker. Everyone, to be "happy in his work" has to feel that he has some trait or ability which causes him to stand out from his fellows. To fail to get a job with his chosen employer at the "Call," and then to be directed by the Labour Board Manager (or his clerk) to a job in which the man has no interest is something which could cause deep resentment.

The "labour unit" dawdles along to the job, doesn't like the look of it, or of the other men, or of the foreman or ganger. He has no heart in his work—quite the reverse. And could anyone blame him? Men are human, and to get down to work willingly and cheerfully they must be made to feel that each has been chosen for himself.

The good "pool" man wants a "home," wants to work with his friends. He wants to be loyal. If these things are not obtainable, he will be either a trouble-maker, or easy prey to trouble-makers. It stands to reason, if his self-respect isn't supported and built up, he will find an outlet outside the Union and outside the general body of workers.

Let, therefore, serious thought be given to finding a new way of getting men who cannot find a job where they would rather work fixed up in congenial work elsewhere. What is wanted by employers and workers is for every job to be filled by a willing and suitable man. Is this only a pipe-dream, or could some experiments be tried?

36, Kings Avenue,
Woodford Green, Essex.
1st November, 1958.

Yours faithfully,
EDGAR A. LEWIS.

Sir,—Although I agree with "Poseidon" that it is not a good thing for a dock worker to work for a number of employers in one week, I doubt if handing over the management of all loading and discharging to Port Authorities is the best remedy. In London, for example, the work on the quay and the discharging in some docks is carried out by the P.L.A. Loading ships, which requires more care and skill, is carried out by independent stevedoring firms.

Some shipping companies have their own stevedoring departments in charge of master mariners experienced in cargo work and assisted by foremen who have a long practical knowledge of loading and discharging. I cannot think of a better set-up. I

Correspondence—continued

presume "Poseidon" would have them transferred to the Port Authority; if so, one wonders what their reaction would be. If the large stevedoring firms could take over the smaller ones, it is possible that it would be beneficial to dock labour, and, to some extent, prevent disputes.

In my opinion, "Poseidon" gets to the root of the trouble when he suggests a system of training young dockers, and criticises the hereditary system of entering the industry. Perhaps young men after training could relieve the older men of a lot of the travelling round the port. It would give them experience in handling different commodities. The uncertain times of arrival of ships makes planning labour difficult, but something might be done on these lines.

I do not agree that Unions should be run by the Managerial class. Of course the men who have worked on the job can best understand the problems of the men they represent, and I do not believe that a man with experience of running big business could deal any more efficiently with the many problems that lead to strikes. Higher education and self-confidence are not the only attributes necessary to persuade minorities that they are taking the wrong action. While the "one-out, all-out" principle is in vogue almost any irresponsible worker can start an unofficial strike.

Perhaps Union leaders have been unsuccessful when pointing out a reasonable attitude to their members, who, with large sums earned on piece work rates and overtime, can afford to be arrogant. But can the quick turn-round of ships be assured without piece work rates and overtime?

Yours faithfully,

30th October, 1958. M.M.

New Zealand Waterfront Industry

Annual Report of Commission

In the past, the New Zealand Waterfront Industry Commission has encountered difficulties in completing its annual report and accounts for a financial year ending 31st March for presentation to Parliament prior to consideration of estimates of expenditure. It has therefore been decided that in future the financial year will end at 31st December and, for this report, a period of only nine months, ending 31st December 1957 will be considered. In order, therefore, to make a correct comparison as to rates of work, etc. for complete years, some of the statistical data have been correlated to compare with figures for the year ended December 1956.

There was a slight improvement in rates of work during the 12 months ending 31st December as compared with the previous year, and stevedoring costs for many classes of cargo showed slight reductions. The progressive increase in non-productive time which has taken place in recent years was arrested and, during the year, there was a small reduction in this time. The total cargo discharged and loaded at New Zealand ports was 11,346,000 tons as compared with 10,976,000 tons in the preceding year, an increase of 370,000 tons. During the year there were three stoppages of work involving a loss of 22,717 man-hours. The most serious of these stoppages was at Auckland, as a protest by the union at the refusal of the employers to reinstate 33 men who had been dismissed. This resulted in the loss of 18,771 man-hours.

Overseas refrigerated vessels were turned around in approximately the same time as during the year ending 31st March 1957, the average days on the coast for vessels discharging and loading being 55.04, as compared with 54.93. The average tonnage discharged and loaded per vessel increased from 15,977 tons for the year ending 31st March 1957 to 16,363 tons for the year ending 31st December 1957. Vessels loading only, spent an average of 31 days on the coast as compared with the previous figure of 31.56 days, while the average tonnage loaded per vessel increased from 7,310 tons to 7,404 tons.

The General Principal Order of the Waterfront Industry Tribunal prescribing wages and conditions of employment expired on 22nd August 1957 and protracted negotiations for a new order took place between employers' and workers' organisations. Agreement was reached for the introduction of an Endowment Assurance Scheme to be financed by equal contributions of 5s. per week by employers and workers. Final details of the scheme have not yet been determined but it is proposed that there should be a death cover with provision for the payment of a lump sum to the worker when he retires at any time between age 60 and 65. The introduction of this scheme will be of considerable benefit to the workers in the industry, and the cost to the employers is estimated at £75,000 per annum.

The workers claim for increases in the basic rate of pay, daily and weekly minimum payments, meal money, and a number of other matters affecting conditions of employment were referred to the Tribunal. A new General Principal Order was made by the Tribunal on 18th December 1957, effective from 6th January 1958. This order provides for the payment of two hours for men attending in the morning and engaged for a 1 p.m. start. The weekly minimum was increased from £8 to £9 for "A" grade and from £5 6s. 8d. to £6 10s. for "B" grade workers at main and secondary ports and from £5 15s. to £6 10s. for "A" grade workers at minor ports. Meal money for men required to work overtime was increased from 4s. to 5s. and the freezer rate was increased from 10d. to 1s. per hour. These increases are estimated to cost £80,000 per annum.

No increase was granted in the basic rate of pay. The basic hourly rate of pay has since 31st August 1955 been 5s. 3d. per hour, and the unions asked for this to be increased to 6s. per hour. The Tribunal pointed out that increases in the basic rate of pay to waterside workers since 1951 had been substantially in line with increases in standard rates authorised by the Court of Arbitration since that date. Waterside workers had in addition received a further 3d. per hour "equity money" which was paid in consideration of certain concessions agreed to in relation to conditions of employment. The cost of living increases granted by the Court of Arbitration have been applied to the waterfront and the Tribunal did not consider an increase in the basic rate could be justified on the ground of increased costs.

The Tribunal, under the Waterfront Industry Act 1953, is required to have regard to a number of matters, including the promotion of the efficiency of waterside work and the full and proper utilisation of waterside labour. The Tribunal considered these objects would be achieved more by the provision of improved conditions of work than by an increase in the basic rate of pay and kept these objects before it in considering the proposals of the parties concerning conditions of work.

In making principal orders the Tribunal is also required to have regard to the economic stability of the country. The Tribunal considered the economic future was by no means bright and that a period of some difficulty seemed to lie ahead and stated that in these circumstances anything which would materially increase shipping costs was contrary to the public interest. The new general order was made for a period of two years, but, in case it should be wrong concerning the economic prospects of New Zealand, the Tribunal provided for the basic rate of pay to be reviewed, if so desired, after the expiration of 12 months.

The average weekly wage has increased from £20 1s. 3d. for the year ending 31st March 1957 to £20 12s. for the year ending 31st December 1957, while the average weekly hours has been slightly reduced from 46 to 45¾ hours. The highest average wage of £22 14s. 7d. per week, was earned at Wellington.

The introduction of import selection because of the serious depletion of overseas funds must during the next 12 months result in a decline in the volume of imports from overseas. It is not anticipated that the reduction will result in any registered waterside workers losing their jobs, although there may be a drop in the average earnings. Any reduction in the total trade of a port will be met firstly by a reducing in the employment of non-registered workers and if it is then necessary to reduce the Bureau limitation, as fixed by the Port Conciliation Committee, this reduction could be effected by natural wastage through men leaving the industry.

Shipboard Cranes and Burtoning Gear

Research in the United States

On February 13th of this year, a symposium on maritime research was held under the sponsorship of the Maritime Cargo Transportation Conference of the National Academy of Sciences —National Research Council. The papers read at this convention have now been published in one volume entitled "Recent Research in Maritime Transportation," which is obtainable from the Publications Office of the National Academy of Sciences, Washington 25, D.C., U.S.A., for the price of $2.00. The book consists of 124 pages and contains:—

(1) a summary by C. R. Denison, Research Co-ordinator of the Maritime Administration (MARAD) which lists the Administration's research programme for the ten years between 1950 and 1960;

(2) a method of analysis for estimating the overall economics of an integrated door-to-door land-sea van-transport system, outlined by F. L. Weldon, Director of Research, Matson Navigation Company;

(3) a report by Major H. A. Ablett of the U.S. Army Transportation Research and Engineering Command on the methods used in a TRECOM study of optimum container sizes and designs for the requirements for military general cargo;

(4) a correlation by N. R. Farmer, Naval Architect and Project Engineer, George G. Sharp, Inc., of cargo capacity, speed and estimated construction cost of six roll-on roll-off vessels, based on actual designs;

(5) a description by F. B. Graham, Senior Research Analyst, Matson Navigation Company, of a method for the economic comparison of ships of different types, sizes, speeds, and power plants, including nuclear-reactor systems, through the use of an electronic computer to simulate various types of voyages;

(6) an analysis by L. A. Selogie, Associate in Engineering, University of California at Los Angeles, of the actual flow of information in the communications network of the maritime transportation system, together with recommendations for the improvement of administrative systems and information flow;

(7) a comparison of shipboard cranes and conventional burtoning gear in cargo handling performance presented by R. P. Delrich and A. W. Friedberg, M.C.T.C. Transportation Analysts.

In the July, 1958, issue of this Journal, an examination was made of the comparative efficiency of quay cranes and ships' gear. As part of the study of ships' gear, the article (The Ships' Gear versus Quay Cranes Controversy by E. S. Tooth) dealt in some detail with the American system of burtoning gear. It is of interest, therefore, that at this symposium a paper (No. 7) was presented in which burtoning gear was compared with ships' cranes. Since "load" traffic, such as goods on pallets and in containers is increasing at the expense of loose cargo, more attention than ever is being paid to primary lifting appliances.

As will be seen from the following extracts of the paper, the staff of the M.C.T.C. drew the conclusion that for the efficient handling of many types of cargo, there was little to choose between the two types of gear, but for the discharging and loading of at least one category of goods, advantageous results could be obtained if ships' cranes could be employed.

In their introduction, the authors state that the proponents of shipboard cranes have long argued that cranes are far superior to the married fall system of cargo transfer between ship and pier. In an effort to resolve conflicting views of this subject, the Maritime Administration has placed in service a converted Liberty Ship which is equipped with 5-ton safe working load (SWL) full revolving, level luffing, gantry-mounted jib cranes. The task of evaluating the effectiveness of the equipment placed on this ship was given to the Maritime Cargo Transportation Conference with two requirements: (1) determine whether cranes have any significant operational advantages over conventional burtoning gear, and (2) ascertain the "impact" of crane equipment upon the manpower involved in the cargo transfer process between ship and pier.

The crane-fitted ship is the m.v. "Thomas Nelson," one of four Liberty ships converted to achieve improved steaming speeds in the programme of MARAD to modernise the U.S.A.'s large Liberty-ship reserve fleets. This ship is equipped with five deck cranes of two types. Three cranes on the forward deck are mounted on gantries which travel on tracks running athwartships at the ends of the hatches which they serve. They are driven and controlled by an electro-hydraulic mechanism. Two cranes serving the hatches abaft the midships house are centreline mounted on gantries which span the hatches and travel on longitudinal tracks. Their drive and control are provided by an electro-mechanical arrangement. Both types of cranes are capable of hoisting, slewing, travelling and luffing simultaneously with a full load of five long tons. Each type has an outboard reach of 20-ft., although jib lengths differ.

In the examinations of the performance of this ship, two conventionally rigged vessels were selected for comparison purposes. One is another "modernised" Liberty ship, the s.s. "Benjamin Chew." The cargo handling equipment of this ship is approximately of the conventional variety, consisting of 10-ton SWL booms, steam winches, electrically activated topping lift winches and hand operated vang winches. The other is a standard C-2 type freighter, the s.s. "Southport," which is equipped with 5-ton SWL booms and electric winches. This last ship was included in the study to provide a more familiar basis of comparison to ship operators with interest in this subject.

In this study, the evaluation of the particular crane installations of the "Nelson" are of secondary importance. The primary purpose of the study is the examination of the general operational features of shipboard mounted cranes as compared with conventional burtoning gear. The ships used in the study provide a vehicle for understanding and studying these operational features. Hence, the conclusions of this report are generally applicable to shipboard mounted, level luffing, jib cranes.

Controlled Tests

The first step in undertaking this study was to set up a series of controlled tests of both the crane ship and the conventionally rigged s.s. "Benjamin Chew." The principal purpose of these tests was to compare the cargo handling performance of the two ships under identical conditions in which most of the physical variables were controlled. A secondary objective was to determine the efficacy of controlled tests in evaluating this type of equipment.

The results of the tests showed that the crane-fitted ship fared better under almost all conditions tested. In loading general packaged freight, the crane ship had a 14% ± 1% advantage in tons per hour over the standard rig. In discharging, the crane ship achieved a 22% ± 2% advantage. In loading Army CONEX containers in the hatch square, the crane ship's performance exceeded that of the conventional ship by as much as 100%. In the discharge of these containers the performance of both was about equal. These results were based upon tests of the physical loading and discharging of general packaged cargo and Army containers.

Other tests were conducted to ascertain the maximum operational hook speeds of the two types of equipment. These tests revealed that the transit speed of the crane hook was slower than that of the standard burtoned hook; yet in the loading and discharge tests previously discussed it was found that crane hook cycle times, that is from pier to ship's hold and back again, were less than those of the conventional rig. The slightly lower transit speed of the crane hook was effectively overcome by another and more important advantage of the crane. That advantage is the draft-spotting ability of the crane. It is this single characteristic which distinguishes the crane's mode of operation from that of the married fall rig. It results in a faster hook cycle from pier to hold and back again. This advantage was reflected in reduced hook time at the pier and reduced hook

Shipboard Cranes and Burtoning Gear—continued

" wait-for-hold " time. In a loading operation, hook " wait-for-hold " time is a delay induced upon the hook transit by the inability of the hold gang to receive the draft being delivered. During this time the hold gang is occupied in stowing the previous draft of cargo. In discharge, hook " wait-for-hold " delays usually arise when the speed of cargo breakout by the hold gang is slower than the hook cycle time.

The spotting ability of the crane hook also makes possible a reduction in the number of fork-lift trucks needed on the pier. This stems from the ability of the crane hook to place or pick up drafts of cargo at any of a number of points within the operating radius of the jib, whereas the burtoned hook is restricted to a single point for pick up, and to points on a line between the boom heads for the deposit of drafts. This advantage of the crane permits the fork-lift truck to deliver and deposit a number of drafts in the vicinity of the loading hook, and to take away drafts deposited by the discharging hook anywhere within the operating radius of the hook. The spotting ability of the hook also reduced the amount of time the hook must spend at the pier in picking up or placing loaded drafts or empty pallets.

The spotting ability of the crane is instrumental in reducing the hold work requirement for general packaged cargo. It permits loaded drafts to be landed in the vicinity of the work area when loading, thereby eliminating the need for the hold gang to swing the draft manually toward the stowage area. It also reduces the distance over which the hold gang must carry individual units of cargo between the landing spot of the draft and the final stowage position. The effect of this feature of the crane is to reduce the amount of work required of the hold gang. This reduction in hold work is further reflected in a lesser amount of hook " wait-for-hold " time for the crane ship than for the conventional ship.

In-Service Tests

The foregoing results were published with a precautionary note that they were tentative, since performance was based upon controlled conditions and did not include comparisons of actual in-service operations. The next step to be taken was the testing of these results under actual commercial operating circumstances. Another principal purpose of the in-service tests was to evaluate the controlled tests themselves; in other words, to find out whether the latter gave reliable results and a valuable understanding of the process.

Test Method

Subsequent to the controlled tests performed on the s.s. " Benjamin Chew " and the m.v. " Thomas Nelson," both ships were placed in parallel service on Trade Route 11. To broaden the basis of comparison, a third vessel was added to the in-service survey. This vessel, the s.s. " Southport," is a C-2 type freighter and was added to provide a comparison between the cranes and the type of gear found on a C-2 (high-speed electric winches). MCTC experience in other studies indicated that the electric C-2 winches were faster than the Liberty-type steam winches. It was believed that the C-2 ship would provide an additional and a more realistic base of compromise than the equipment of the " Chew " (steam winches).

Motion-and-Time Study Surveys

To provide a detailed analysis of stevedore methods and commodity characteristics in the trade, an MCTC survey team made frequent visits to the U.S. ports served by the " Nelson," " Chew " and " Southport." Motion-and-time study data were collected by the team in order to analyse the handling techniques and to isolate variables affecting loading and discharging operations. The time study data collection technique used by the team was essentially the same as that used during the break-bulk loading and discharge phases of the controlled tests.

Time-study data provided the basis for an analysis of the relationships of hold-gang work time per draft to the net work cycle of the hook for various commodities. The net hook work cycle is defined as the time used by the hook to make a round trip between the apron and the hold, including terminal time but excluding all delays.

The controlled tests indicated that the spotting ability of the cranes is capable, under certain circumstances, of reducing the amount of hold work required in a break-bulk operation. Whether this reduction in hold work can be translated into an increase in productivity depends, in turn, on the ability of the hook to keep pace with the resulting increased capability of the hold gang.

As a result of the motion-and-time study analysis of stevedore operations, it was found that most of the commodities moving in the trade could be categorised into three general groups based on the relationship of hold work per draft to the net hook work cycle. In all cases, the hook delivers drafts alternately to two hold gang teams, port and starboard, of four men each. The important relationship to be observed are (1) the relation of the total hold work (unhook plus stow) for one team to the net hook work between deliveries to that team and (2) the relation of total hold work to the total hook cycle between deliveries.

Category I: Hold Limited Commodities

The handling of the commodities falling within this category is characterised by a high hold work requirement which exceeds the net hook work cycle. In other words, the factor governing overall output is the rate at which the hold gang is able to stow or break out cargo in the hold. The longer time required to handle cargo in the hold induces delays upon the hook movement between dock and hold. This category is referred to as being " hold limited."

The stowage of woodpulp bales is an example. Individual bales of woodpulp weigh approximately 500 pounds each and are 9.75 cubic feet in volume. The sling used to lift this commodity from apron to hold consists of a flat, wide, reinforced fabric belt which is disengaged from the vertical stack of 5 to 10 bales in the hold by upsetting the bales out of the sling.

Each team of four men required an average of 5.5 minutes to unhook and stow a draft. Assuming that the hold gang required no rest time, it would appear that the capability of the port team is one draft every 5.5 minutes. Since the hook alternates deliveries between port and starboard teams, the time intervals between successive draft deliveries to one team equals the time of two round trips of the hook between hold and apron, minus the times of hook wait for hold. This time is 3.7 minutes and is, then, the hook delivery capability, which must be compared to the 5.5 minutes required by a team to stow a draft. This comparison clearly indicates that, in an operation of this nature, the hold gang's capabilities are the limiting factor in determining productivity.

Summary

With current handling practices, the limiting factor in determining productivity rates for this commodity and others in this category is the capacity of the hold gang. Changes or innovations restricted solely to the ships' gear will not appreciably improve productivity rates for commodities falling within Category I. Significant improvement can be achieved, however, by a change in underdeck handling methods or packaging techniques.

Category II: Hook Limited Commodities

The handling of the second group of commodities of these South Atlantic ports is characterised by a net hook work cycle time of greater length than the hold work cycle. Hence, this category is referred to as " Hook Limited." The arrangement when commodities in this grouping are worked finds the cargo hook delivering cargo to the hold as rapidly as possible and each team of the hold gang stowing its draft in less time than the hook requires to make the two cycles.

The prime characteristic of the commodities which have been grouped in this category is their convenient cylindrical shape. This shape provides a ready aid to stowage in that the objects may be easily rolled from the square of the hatch, where they have been deposited by the hook, to their final stowage position within the compartment.

The commodities moving in the trade which were found to fall into this handling category include: linerboard rolls; drums of resin, liquid pine products and petroleum products; tierces and hogsheads of tobacco; and newsprint.

Shipboard Cranes and Burtoning Gear—continued

Linerboard is, by far, the major commodity falling into the "hook limited" category in this trade and consistently shows a relationship wherein the hold work is but a small percentage (34% to 39%) of the net hook work cycle.

The productivity of the conventionally rigged ships is approximately equal, both ships yielding a rate of about 38 drafts per hour, as measured by the net work cycle of the hook. The crane ship, however, has a somewhat longer cycle time than the two conventional ships. Its hook transit speed is somewhat less, or slower, than either the "Chew" or the "Southport," but its hook time in hold is slightly lower, or faster, giving rise to the contention that, in this instance, the hook spotting ability of the crane gear yields this small economy. This is offset, however, by the fact that hook time at apron is slightly higher for the crane ship than the others.

The port of Georgetown, South Carolina, is primarily a linerboard port. The longshoremen involved handle linerboard exclusively and, as a consequence, are expert in the subtleties of the stowage of this commodity. This expertness is revealed in the markedly higher average rates of handling of linerboard on the "Thomas Nelson" and the "Southport" at Georgetown, as compared to the rates prevailing at Jacksonville and Savannah. These latter two ports handle many various commodities.

At Georgetown, the rates achieved by the "Nelson" and "Southport" are almost identical. The mathematical standard deviations of the mean productivity rates indicate no significant difference between them. The fact that no difference is apparent between these ships may appear to be at variance with the previous discussion, but the reason for the similarity in loading rates and the dissimilarity in hook cycle times will be explained later.

The lower rate of productivity for the "Beniamin Chew" stems primarily from the chronic low steam pressure available to the winches when all hatches are working linerboard. This is further borne out by the fact that the highest rate achieved by the "Chew" was during one voyage when only two hatches were being worked. In all other cases, at least four hatches were loading.

The net result of the comparison between the performance of the three ships loading linerboard at Jacksonville is that there is no difference between them. The small differences between their mean rates are the result of chance variations of the data.

For loading drummed goods (another Category II commodity) in both the "Nelson" and the "Southport," hold work time was about 46% of the net hook work cycle. While hold work is proportionate to hook work in both cases, the absolute hold and hook work cycles differ. Hold work between the "Southport" and the "Nelson" differs by 2.4 minutes and hook work differs by 2.6 minutes. The net result of these differences is an advantage, accruing to the conventional vessel, of 81% in drafts per hour. This advantage to the "Southport" develops primarily from the faster hook transit speed of that ship. The performance of the "Nelson" in this instance was, no doubt, influenced by two factors: (1) an inexperienced winchman operated the cranes, and (2) the work was performed between the hours of 11 p.m. and 3 a.m. "Southport" data on the loading of drummed commodities were all obtained during daylight working hours, and all winchmen were familiar with the operation of the C-2 electric winches.

While the data used in this illustration are not entirely comparable, they do illustrate that the handling of drummed goods resembles that of linerboard in that the net hook work cycle constitutes the governing element in output, and that the draft spotting ability of the crane does not provide a distinct advantage over the conventional equipment.

Summary

The foregoing discussion classes several commodities into a group described as "hook limited." These commodities are so classed for the reason that current methods of handling these commodities into or out of the ship is characterised by hold work times which are considerably lower than net hook work cycle times. The element governing cargo handling rates of commodities falling within this category is the speed at which the hook transports cargo to or from the hold. Handling rates are relatively unaffected by the spotting ability of the crane.

Category III: Balanced Work

Cargo operations which constitute Category III are referred to as "balanced" because of the approximate equality of the hook work cycle to hold work per draft. In an example of Category III operations (a loading operation with cotton waste bales on the "Nelson") each team of the hold gang required 3.8 minutes to unhook and stow a draft of five bales. Considering the operations of just one of the two teams, and the hook work interval between deliveries to that team, total hook work time between deliveries to one team averaged 4.6 minutes. The relation of net hold work to net hook work is 0.83 to 1. The surplus time which the hold team has available between drafts consists mostly of necessary "rest and make-ready" time, and therefore is not to be considered unproductive.

While, in this example, hold work time is slightly lower than net hook work time, a situation in which hold work slightly exceeds the net hook work cycle may also be considered "balanced."

The feature distinguishing Category III cargo handling situations from Categories I and II is the addition of the influence of the variability of hook and hold cycles on productivity. When productivity is a clear-cut function of the capability of either the hold gang (Category I) or hook (Category II), improvement can best be attained by increasing the capability of the slower element in the system. In Category III, productivity is a function not only of the slower element, but also of the variability in hook and hold cycles which produces induced delays in the system. This effect of variability introduces itself as a factor determining productivity when the hold and hook cycles become equal to each other, or approach "balance." With the addition of variability as a factor, it become possible to increase productivity, not only by increasing the capability of the slower element, but by increasing the capability of either the hook or the hold gang, regardless of which is the slower.

During the controlled tests, in the break-bulk loading and discharge operation, it was found that the spotting ability of the "Nelson" cranes provided faster work cycles both for the hook and for the hold gang. The hold work interval per draft was reduced because of the crane's ability to spot each draft advantageously, thus reducing the time required for the hold team to move the draft between the point at which the draft is landed and place of stow. The work cycle of the crane, in turn, was shorter than the work cycle for the "Chew" gear due to the effects of the crane's spotting ability at the apron. During these controlled tests, in which the effects of extraneous variables were limited or completely stabilised, the "Nelson" cranes achieved a productivity advantage in break-bulk loading of 14% over the "Chew," and in discharge, an advantage of 22%.

In attempting to evaluate the effect of crane gear on Category III cargo operations, the MCTC staff found that the effect of uncontrolled variables played an overwhelming part in influencing productivity rates in this category. For each type of vessel, the difference in rates achieved for 'tween deck and lower hold can be attributed to the effects of compartment configuration (most probably the depth of the compartment from deck to underside of beams overhead). This effect of compartment configuration prevents use of the overall ship average for comparison of productivity rates for this commodity. When the rates are analysed for the three vessels based on a specific compartment (i.e., 'tween deck or lower hold), the differences in productivity as indicated in the following Table are not considered significant. Additional data are necessary for "Nelson" 'tween decks and "Southport" lower holds.

Conclusions

The controlled tests served to identify the operational characteristic of cranes which distinguished their mode of cargo transfer from that of conventional shipboard equipment. Controlled testing also provided the basis for recognising the circumstances under which crane equipment performs advantage-

Shipboard Cranes and Burtoning Gear—continued

COMPARATIVE STEVEDORE DATA FOR A CATEGORY III COMMODITY

(Loading bales of cotton waste, Charleston, S. C.)

Stowage Compartment	s.s. "Benjamin Chew" (7 Voyages)			m.v. "Thomas Nelson"* (6 Voyages)			s.s. "Southport"** (5 Voyages)		
	Long Tons	Net Gang Hours	LT GH	Long Tons	Net Gang Hour	LT GH	Long Tons	Net Gang Hours	LT/GH
Deep Tanks	330	16.9	19.5	—	—	—	32	1.4	22.9
'Tween Decks	816	39.3	20.8∓1.9	254	11.1	22.9∓0.2	862	49.4	17.4∓1.5
Lower Hold	1010	41.0	24.6∓1.6	1260	45.9	27.4∓1.7	262	9.3	28.2∓0.6
Total	1256	97.2	22.2	1514	57.0	26.6	1156	60.1	19.2∓

* Performance at No. 3 hatch omitted. ** Includes a voyage of s.s. "American Miller" (C-2 type).

ously, and established an undertaking of the capabilities of crane and conventional equipment.

Time study analysis during the in-service examination supplied the key to the recognition of the importance of the handling characteristics of various commodities. This was supplemented by stevedore data enabling comparisons to be made of performance based on large quantities of cargo over a longer time period.

The conclusions stated herein stem from the combined experience of the controlled tests and the in-service examinations of the crane ship and the conventionally equipped ships in a specific trade. No attempt has been made to produce a cost study to determine the economic feasibility of crane installations.

(1) The relative cargo handling efficiency of shipboard cranes as compared to the conventional boom and winch arrangement is determined by a number of independent variables, thus precluding a single overall statement as to the absolute superiority of either type of gear. The most important of these independent variables are (a) the physical characteristics of the commodities to be handled, specifically unit shape, size and density, and (b) the methods used to handle the commodities on the apron and in the hold.

(2) Advantageous results may be expected with shipboard cranes in the loading and discharge of commodities falling within the "balanced" handling category (Category III). The degree of advantage depends upon the use of the crane's spotting ability to reduce manual horizontal movement in the hold.

(3) The rate of loading (tons per gang hour) can be improved by as much as 100% with the use of crane gear when stowage is by direct vertical positioning (e.g., container stowage in the square of the hatch).

(4) Little or no improvement over conventional burtoning equipment can be expected from the use of ship-mounted cranes in situations where cargo handling operations are drastically hold-limited, or where there is little premium on spotting ability.

Hinkley Point Nuclear Power Station

Description of Marine Installations at Combwich

In December, 1957, work was commenced on the (500 MW) atomic power station at Hinkley Point in Somerset, which when completed will be the largest in the world. The erection has been undertaken by the English Electric—Babcock and Wilcox—Taylor-Woodrow atomic power station group, for the Central Electricity Generating Board. The contract is scheduled for completion by 1962.

Much of the heavy equipment to be installed is being manufactured in the North of England and Scotland, and to eliminate the road transport problems the most practical method of delivery is by sea. It has therefore been necessary to execute extensive maritime works at Combwich, a village a few miles from the main site, where a wharf for handling ships up to 1,500 tons has been completed in six months. Other works which have come under this section include the provision of an extensive cooling water system for the station, and the construction of a seawall 3,500-ft. in length which involved the placing of some 17,000 cubic yards of concrete and the reclamation of 70,000 sq. yards of foreshore.

Cooling Water System

The power station, with its electrical output of 500 MW, demands a cooling water circulation of 35 m. gallons of water an hour. This volume of water will flow to the site through two 11-ft. diameter tunnels about 2,000-ft. long, driven under the Bristol Channel for most of their length, to the intake structure, a concrete island to be constructed about a third of a mile offshore.

In addition to the progress on the reactors and associated works, considerable progress has now been made on the cooling water system which is the largest of its kind to be required for a nuclear power station.

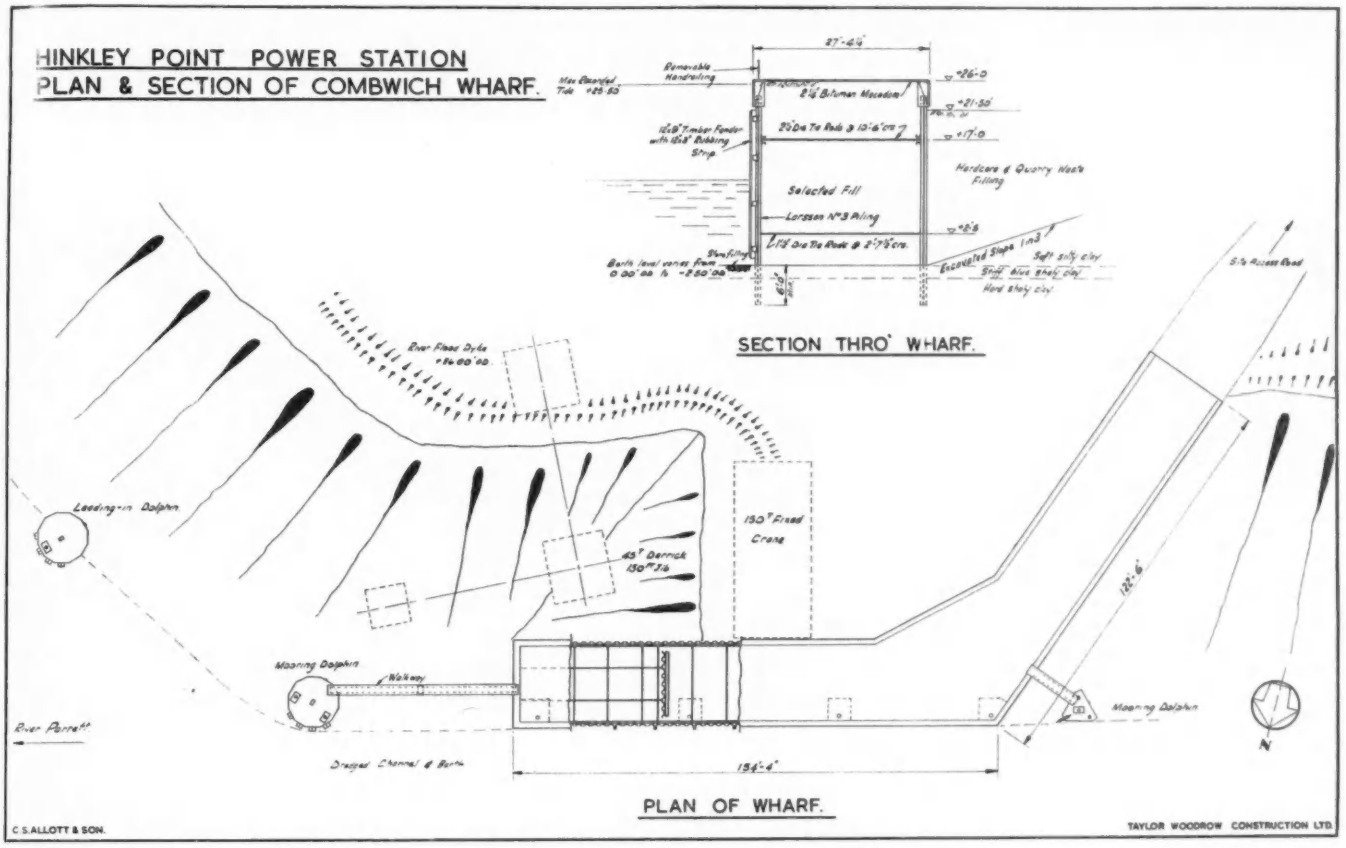
The new sea wall, 3,500-ft. in length.

The concrete structure of the island will be floated, Mulberry Harbour fashion from a dry dock on the west side of the site. This dry dock has been finished and its semi-circular ring of steel sheet piling will be removed, at the appropriate time and tide, for the intake structure to be towed into its permanent position early next year.

The structure itself will be a reinforced concrete caisson, 60-ft. high and 96 ft. in diameter, in the shape of an upright cylinder and, with its false bottom, will have a dead weight of approximately 3,000 tons when towed to position.

When placed, it will rest on the sea bed on eight "spud leg"

Hinkley Point Nuclear Power Station—continued



supports, hollow steel columns, 60-ft. long and 4-ft. in diameter. A ring of steel piling previously suspended around the floating structure will then be driven into the sea bed to provide a cofferdam, within which the intake and tunnel connections will be completed.

The intake system has been designed to supply a second Hinkley Point Station, the probable cooling water requirements of which would be 50 m. gallons of water an hour (making a combined output of 85 m. gallons for the two), but only the off-shore ends of the two larger 13-ft. diameter tunnels will be constructed at this stage.

On the shore-side, an access shaft 18-ft. in diameter, and approximately 100-ft. deep has already been sunk behind the completed sea wall and a 7-ft. diameter pilot access tunnel is being driven seawards. This will be lined with cast iron segments. Where they leave the access shaft, the two main concrete lined water tunnels will have an invert level 92-ft. below finished ground level.

Driving will begin from a cross-heading itself driven from the access shaft, and proceed to the intake structure in one direction and back to the pumphouse in the other. Seawards it will stop short of the intake structure until the main portion of the work is completed there. Then the tunnels from the intake structure will link up with them.

Each of the inlet tunnels will supply one half of the Pumphouse Forebay, and from the pump chamber, water will flow to the condensors in the Turbine Hall through twin delivery culverts, 8-ft. 6-in. square, constructed in open cut and approximately 35-ft. below finished station level.

The inlet culverts have been designed to carry the outlet culverts directly on top of them for a distance of 700-ft. from the Turbine Hall. The outlet water will be led 1,100-ft. in all to a reinforced concrete seal pit behind the sea wall at the eastern edge of the site. From there, it will be discharged through a further 800-ft. of concrete culverts to a head wall off-shore, beyond which a channel will be excavated in the open water. Final discharge will be some 2,300-ft. east of the intake point.

The off-shore outlet culverts and the head will be constructed in one large steel sheet-piled cofferdam over 800-ft. long in which excavation for the culverts is now proceeding.

The Cooling Water Pumphouse with its adjoining screening bays, suction dock and pressure chambers will all be below ground level with an adjoining Chlorination House above ground level.

Sea Wall

The sea wall which protects the entire frontage of the site is 3,500-ft. in length. In order that the excavations located behind this wall and in front of the existing cliffs could be started at the beginning of the summer of 1958, the first 2,000-ft. was planned and constructed in a period of five months. The work was executed despite the winter and spring tides which have an extreme range of 40-ft., of which 17-ft. is experienced at the position of the wall, some 300-ft. in front of the existing cliffs.

The wall, constructed between tides, was formed in three main lifts. The first 1-ft. comprised the toe and foundation of the wall which was put down a minimum of 2-ft. and a maximum of 7-ft. into the foreshore, depending upon the strata exposed in trial pits previously dug along the line of wall. The fore-shore consists of an irregular series of limestone layers approximately 9-in. thick bedded in shale and inclined at approximately 10 degrees to the horizontal.

The second lift comprised the main tapering portion of the wall. Large prefabricated steel shutters were lifted into position by 22 RB excavators rigged as cranes and travelling on the rock-filled access bank behind the wall.

The third section comprised the top lift and bullnosed parapet.

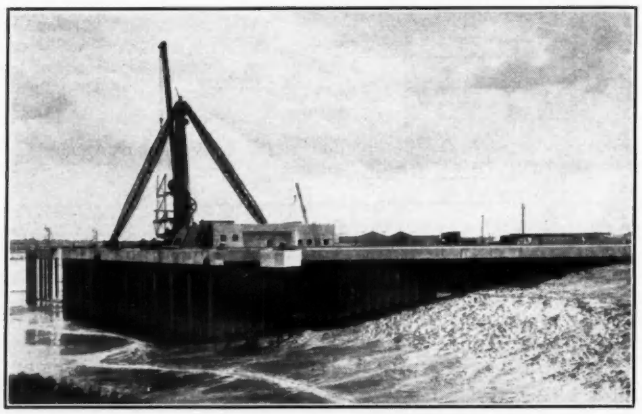
The wall was constructed in alternate 21-ft. and 4-ft. lengths, the latter being cast a minimum of 28 days after the former. Immediately the shutters had been removed from the main lifts of the longer bays a back shutter of precast concrete slabs was applied to the construction gaps in order that the wall could be back-filled without delay.

Hinkley Point Nuclear Power Station—continued

The concrete used in the wall contained no additives but was a richer mix than used generally on the station containing 560 lbs. of cement per cubic yard.

Combwich Wharf

The new wharf constructed near the village of Combwich, is situated on a small tributary of the River Parrett, north-west of Bridgewater and four miles from the power station. It will accommodate ships of up to 1,500 tons and will handle the heavy equipment being used for the construction of the power station. This equipment includes the large and heavy plate for heat exchange and pressure vessel fabrication, portions of the giant 400-ton Goliath crane, transformers and portions of turbo alternators, some of which weigh up to 130 tons each. Prior to 1930, Combwich had a lively small ship trade with cargoes consisting chiefly of bricks and tiles. The facilities have been modernised by works including the provision of a 200-ft. wharf, the installation of a 45-ton derrick and a 150-ton fixed luffing crane, the foundations of which have been constructed with the wharf, a hardstanding for temporary storage and a reinforced concrete bridge to carry a new service road.



View of the new wharf showing the 45-ton derrick and foundations for the fixed crane.

It is expected that once shipments start there will be one arrival a week over the next two years during which period a total of 30,000 tons of cargo will be handled. The frontage involved the excavation of 20,000 cubic yards of mud and silty clay and the subsequent driving of 340 tons of sheet piles (Larssen No. 3) in the form of a cellular cofferdam 26-ft. wide and 200-ft. long, running parallel to the shore with a turn shorewards at the western end to join up with the access road to the wharf. The cofferdam was filled with compacted quarry waste and topped off with a tarmacadam surface.

Two large dolphins, each consisting of a group of box piles 42-ft. long driven 15-ft. into the river bed and capped with a reinforced concrete blocks, have been constructed at the eastern end of the wharf to facilitate the berthing of ships.

The Acrow Jet Dredger

New Technique Demonstrated

A new type of dredger, which has been developed by Messrs. Acrow (Engineers) Ltd., Saffron Walden, Essex, was demonstrated recently at St. Ives on the Great Ouse River. The demonstration took place before a large audience of engineers and representatives of river boards, and of mining companies. The practical applications of the dredger, under working conditions, were shown as it was engaged on deepening the river and recovering gravel.

The use of high-powered jets for disturbing material to be removed from underwater, has been known for a considerable time in dredging work. The new Acrow Jet dredger, however, combines this with a vacuum system, also produced on a jet principle, for extracting the material, and passing it over a distance of up to 1,000 feet for dumping. This entirely new system operates on a Jet/Venturi basis, and the application of such a method, which has not previously been attempted in this country, is a notable step forward in dredging technique. The method completely eliminates the use of cutting heads, buckets, plates and sludge pumps and the consequent wear and tear on these parts. The pumps on the new dredger are merely used for pumping water to the jet heads, while the rest of the operation, from the point of extraction to delivery, is achieved by the vacuum system.

The uses of this method are equally applicable for the desilting of rivers, canal irrigation, land reclamation and the recovery of building materials from rivers and gravel pits etc. It is also claimed to greatly simplify all alluvial mining operations, but the present development is not intended for ocean dredging.

The accompanying illustration shows the dredger at work on the River Ouse. The details of this model are as follows: length 56-ft., width 16-ft., draught 3-ft., height above water line 12-ft., and maximum dredging depth 35-ft. It has a capacity of 45-65 cu. yds. of solids per hour delivered 600-ft. at 6-ft. elevation. The power plant comprises a diesel electric generator, 160-Kw., driving two electric pumps each with 85 h.p. motors. The unit is operated by two men — one in control cock-pit and one on generator.

There are no moving parts working under water and the dredging, including work on virgin ground, is achieved by powerful jets through nozzles, disintegrating the material in the immediate vicinity of the suction pipe. The sludge is then drawn through the pipe by a jet created vacuum and as there is a straight through passage to the point of discharge, obstacles such as trees, roots, solid objects and vegetation will not stop dredging operations.

Stones up to 6-in. diameter can be dredged and all material entering the suction pipe passes to delivery point without interference of any kind. The dredger can be designed to operate at a depth of up to 100-ft. with normal delivery pipe sizes up to 12-in. diameter, but larger plants can also be constructed to fulfil special conditions.

The power supply can be from mains, site power plants, diesel direct driven pumps and petrol direct driven pumps. The dredger is controlled from a raised cock-pit with a clear view of the whole of the equipment, and grouped within this are one-man controls for the operation of the machinery, including the individual electric motors on working capstans through which it is possible to swing and control the dredger laterally during the process of the dredging operations.

The dredger is specially designed to be broken down into parts, which can easily be transported over land or by air, and this together with its considerable operating depth at low operation cost, make it a machine suitable for overseas work in inaccessible areas.

Removal of Water Accumulated During Fire Fighting on Ships

Further Experiments at Southampton

By E. T. HAYWARD, O.B.E., M.I.FireE.
(Chief Officer, Southampton Fire Department)

Readers of this Journal may recall that the November, 1954, issue included an article entitled "Ejector Pump for Use on Ships Fires." This described the experimental work that has been carried out by the Southampton Fire Department, in their endeavours to find a pump suitable for removing the water that accumulates in cabins and compartments during fire fighting. Following tests it was decided that an ejector pump would meet the majority of requirements, a particular advantage of this pump being that where access is available for men with a line or hose the pump can be put into position and, providing the priming nozzle is kept charged, further attention is not required. The pump will continue to operate, even if the men are driven back by smoke and heat.

The following account gives further details of the use of this pump in a series of fire fighting exercises held at Southampton Docks in the Summer months of this year.

In co-operation with the Union Castle Mail Steamship Co. Ltd., the first exercise took place on the "Athlone Castle" and consisted, in the main, of the removal of a large quantity of water which had accumulated high up in the vessel amidships. For the purposes of the exercise it was assumed that a serious fire had broken out. The ship's fire parties were immediately alerted and took action with portable fire equipment and lines of hose from hydrants, while a fire call was transmitted to the Southampton Fire Brigade who attended with three Pumps and Emergency Tender.

The suction of the ejector pump, which has been led down through the lift shaft, being placed into the swimming bath.

As the exercise progressed, it was assumed that stability measures were necessary and that immediate steps must be taken to remove a quantity of water which had accumulated in the region of the first-class swimming pool. This task presented the Fire Brigade with a formidable problem as it entailed lifting water vertically over a height of 24-ft. and discharging it outboard through 88-ft. of 4-in. hose. In order to reduce the amount of suction hose required, it was passed down through a lift shaft direct to the swimming pool. It was considered impracticable to use an internal combustion pump for this work owing to the noise and ventilation problems. It was, therefore, decided to attempt the work with an ejector pump, fitted with a 1-in. nozzle. This was slung outside of the liner through a port and fed by a Major Pump from ashore; priming was effected almost immediately. It was estimated that at least 45 tons of water per hour were being discharged from the swimming bath. An interesting feature was the complete absence of pumping noise.

The results obtained from this exercise are being carefully examined and further thought is to be given to the question of the disposal of water from ejector pumps when long lines of discharge hose are required.

Other exercises have included such features as engine room fires; fires on a "dead" ship; fires in a ship when lighting has to be provided from ashore, and breathing apparatus tests.

With a view to furthering the fire training of the Company's marine engineers and deck personnel, it has been arranged that a series of training courses be carried out within the Southampton Docks. Facilities for this work have been granted by Captain Morgan, the Dockmaster, and will include general types of fires, oil fires and electrical outbreaks. There is no doubt that this training will prove of great value to all concerned and the Fire Service will benefit from the close contact with the Engineers and Deck Officers.

River Pollution in Tidal Waters

Problems Concerning Newcastle-upon-Tyne*

By T. L. J. COXON, M.D., B.S., B.HY., D.P.H.
(Medical Officer of Health, Tyne Port Health Authority)

Good river water should conform to certain standards in clarity and colourlessness, and be scentless and chemically neutral. Neither truly acid nor alkaline, it should contain only traces of such minerals as in the course of its passage are necessarily dissolved. It must also contain enough dissolved oxygen to easily maintain aquatic life. Suspended matter and excess minerals are almost invariably the result of trade processes and range from mine water to paint and chemical wastes, including oil and tar washings, and a thousand other materials foreign to a normal stream. To bring such contaminated water back to even comparative purity requires sedimentation and neutralisation before it is allowed to return to the river from which it probably originated.

Generally speaking, trade effluents present only the occasional problem, and legal powers to enforce compliance with requirements are reasonably adequate. Furthermore, except where permission is given to connect with local sewers, no cost devolves on the local authority. In the case of inland authorities, from the point of view of expert supervision, it might be cheaper and more effective to allow such trade wastes, unless they are so concentrated and lethal as to seriously interfere with the process of self-digestion, to enter the common sewers and to mix with the sewage and receive treatment as one entity at the sewage works. Multiple points of supervision would be replaced by a few.

As, however, most rivers in their tidal reaches are exempt from the provisions of the River Pollution Act, it is academic, more than practical, to study the effect of various acids, alkalis, mineral poisons, detergents, oil traces, aniline derivatives, agricultural sprays, etc., on the process of aerobic and anaerobic treatment in septic and activated sludge processes of sewage purification.

The main problem in the 16 or 18 miles of the river Tyne from Ryton in the west to Tynemouth in the east, is the fact that this is a tidal stretch as well as the most highly industrialised and consequently most densely populated area in Durham and Northumberland. This area is dependent, for its water supply, in the main, from the natural watershed boundaries of the Tyne and its tributaries, and certain further supply from Weardale and deep limestone wells in Northern Durham. Water conservancy is of great importance, and in at least one instance within the general area successful purification of mine water has been practised to add its quota to the available supply.

Reduction in Natural Flow

Compounding into reservoirs and continuous pumping from the river and its tributaries at suitable points has reduced the natural flow by some 7,000 million gallons of water every year. This represents a considerable reduction in the cleansing pro-

* Abstracts from Paper presented to the Royal Society of Health at the Town Hall, South Shields, June, 1958.

River Pollution in Tidal Waters—continued

cess and interference with the normal function of acting as a dilutant to render innocuous any focus of contamination. Water so compounded after treatment, to make it of a satisfactory drinking standard, is then distributed to industry and householders for general use, and 10,000 million gallons a year are then returned via the sewers to the parent stream. This is crude sewage, pouring out into 12 miles of river through some 280 outfalls; no treatment has been attempted, nor any sedimentation of solids, or aerobic or anaerobic processing.

Industry has demanded a river to satisfy its needs—a river deep enough to allow the passage to all types of ship; a channel wide enough and deep enough to accommodate freely passing traffic, trading wharves and berths, and deep water launching sites; and all the facilities as if the basin was in truth artificially constructed to plan. Dredging the channel to a mean water depth of 30-ft. was the obvious answer. This the Tyne Improvement Commission have accomplished, and yearly they remove some 26,000 tons of sludge from the main bed and take it 3 miles out to sea. A considerable amount of the sludge is sedimentated sewage.

Whilst improving the industrial advantages of the Tyne, dredging has had the unfortunate effect of further reducing any self-cleansing process that the river might have expected (and which legislature certainly expected) from the effect of the tides, by creating a trough of artificially deepened water with weakened river flow rate which, in conjunction with the tide, reaches a point of stasis for hours each day.

The bulk of the river water with its enormous sewage content is slowly pushed backwards and forwards, dropping a proportion of its suspended solids, and only with infinite slowness, mixing with the cleaner waters of the sea. The sludge, which is constantly and continuously deposited, forms an amorphous substance devoid of oxygen content, deprived of the decomposing action of aerobic bacilli and depending for any change in composition on the slow action of anaerobic organisms. Under this process organic matter is attacked with the formation of gases, chiefly of a methane type and hydrogen sulphide. It is difficult to imagine a more objectionable composition, both poisonous and offensive. Such gas can be seen bubbling up in the river from the Swing Bridge to Wallsend. Massive disturbance of the sludge, such as occurs when it is agitated by a propeller, can and does occasion most nauseous conditions. These are perhaps best observed alongside Newcastle Quay when vessels are manoeuvring alongside.

Scheme for Waste Disposal

The powers which could be used by the rivers boards are withheld from them by the central authority who are loath to extend control over the tidal portions on the grounds of economy. The boards are allowed to effect improvements without the hope or possibility of a radical cure, and naturally they direct most of their attention to the non-industrial portions of their areas. We actually go beyond our physical boundaries to enable authorities outside our watersheds and drainage area to pump their refuse into our rivers. Yet we bogle at the cost of pumping within the area if the result is to connect to a sewage purification scheme instead of the river.

In 1934 a Commission sat to assess the problem and suggest a cure. Unfortunately the terms of reference of the Commission were too restricted to admit all the weight of evidence available, yet their verdict was unanimous as to the necessity of a definite scheme of disposal. Cost and national depression were then an effective deterrent. Now in 1958 cost and possible depression would appear again to be equally effective, whilst the nuisance is greater and the cost by pre-war standards is trebled.

The first obvious step towards the reduction of sewage entering the river is to cut off the supply. Dredging and natural causes may be depended upon to eventually clear up the residue.

Two types of scheme have been put forward for disposing of the crude sewage. The first is to culvert all the sewage into its own river, and, on either side of the Tyne, discharge it into the sea far enough from centres of population and seaside communities, to cause the least amount of nuisance and fouling of the seashores. This would of course involve the creation of huge culverts, ever increasing in diameter, and the carrying of them a considerable distance into the sea.

The second is the concentration of sewage at selected points where screening, settling and processing tanks could be erected. Here by the employment of modern methods of sewage treatment, mechanical agitation, aeration, chemical flocculation, activated sludge and anaerobic action, a clear and harmless effluent could be allowed to join the parent river; most of the water extracted in the upper reaches being thus returned, as it were, to its source.

The settled sludge, containing a considerable quantity of nitrogenous matter, would remain to be dealt with. The extraction of water from this residue is one of the major difficulties and, with effective means of mixing with humus and compost, would involve the installation of elaborate and expensive machinery as well as the employment of a capable trained staff. Certainly, the product when finally evolved would have considerable market value as an agricultural fertiliser, though any such value should be an offset against the cost of the scheme rather than regarded as a primary object. Unmixed sludge could also be used with advantage for filling disused mine shafts and quarries, and also as a basis for reclamation of land in many parts of our area.

The Problem of Sewage Treatment

Many objections to sewage treatment, instead of its carriage out to sea, have been advanced on the score that it sterilised valuable land which would be otherwise available for industrial or building development, but it has been calculated that an area of 6—8 acres could deal with the total sewage of the entire lower Tyneside area. There would in addition be the subsidiary pumping stations, etc., but these would also be an essential part in the operation of the trunk sewer to the sea, so that the land taken up by them cannot be regarded as an additional argument against the treatment scheme.

The main objection to the trunk sewer is the huge outlay in the laying of culverts of such a magnitude, the successful discharge at a satisfactory distance below low water, and the great variation in the ultimate fate of the sewage once it was so discharged. The tide drift is always southerly, and theoretically dissemination should be quickly achieved, but local currents caused by submerged rocky reefs and the prevalence of easterly and north-easterly winds at certain periods of the year are very liable to completely upset calculations causing the deposit on the foreshores of a variety of refuse whose only common denominator is its common offensiveness. Flotation tests to gain further information are taking place, but conclusions based thereon cannot be accepted as applying equally to the 10 miles of coast-line likely to be involved in a sea disposal scheme.

That the solution is a difficult problem involving much outlay of capital, and demanding help from other than local resources, is very true, but it is a job, increasing in urgency year by year, which must eventually be undertaken.

New Bunkering Facilities in the West Indies

A major construction scheme to provide off-shore oil bunkering facilities is nearing completion at Freeport on Grand Bahama Island, and will be in operation early in 1959. The scheme, developed by the Freeport Bunkering Co. Ltd., under licence from the Grand Bahama Port Authority, will provide facilities for all types of ships in relatively protected waters with a minimum depth of 45-ft. Provision has been made for the storage of 100,000 tons of petroleum products and the facilities will include: an 18-in. submarine bunker C pipeline pumping 1,000 tons an hour; a fresh water pipeline; an 8-in. diesel (light and heavy) pipeline; a laboratory to ensure uniformity of supply and to blend fuels to the specific needs of any ship. Permanent mooring buoys and convenient loading lines, which will reduce mooring and unmooring times to less than an hour, will also be provided. The only cost to the customer will be for the oil and water supplied. All port charges will be met by the supplier, with the exception of the hire of the Port Authority tug, which will be available if required.

Litigation in the Port Industry

Specialist Craft and the Docks Regulations

By LAURENCE WEBLEY, LL.B.

Some recent cases before the courts have raised interesting questions on the liability of lock owners for negligence and the applicability of the Docks Regulations to specialist types of craft.

In the "Lottinge" (Owners) v. British Transport Commission the issue was whether the Commission was responsible for the vessel colliding with a lock.

The "Lottinge" was a single-screw motor vessel of London of 4,215 gross tons, length about 382-ft., beam 51-ft. On the 18th January 1957 she was making her way out of Penarth Dock bound for Hampton Roads in ballast. The deck time was about 7.30 p.m. and it was a fine, clear, dark night with a fresh north-easterly wind about force 5. There was no tide in the dock. The ship was in charge of a licensed pilot and exhibiting regulation lights. The lock she was approaching was at the eastern end of Penarth Dock connecting it with the basin with gates only at the outer or eastern end. These were open so the lock was really no more than a passage from the dock to the basin about 380-ft. long and 60-ft. wide. At the eastern end where the gates had been removed there were recesses in the lock side which were entirely unfenced. On the two knuckles at that end green lights were being shown to indicate a clear passage to the ship. The piermaster was standing on the south knuckle watching the ship approach. According to him he stepped back along the lock side to get a line on the starboard side of the ship as he thought she was going to hit. In doing so he stepped back into the recess and fell in the water. At this point the stories of the plaintiff shipowners and the defendants diverged. According to the former the "Lottinge" approached the lock at just over two knots carrying some port wheel to counteract the tendency of the wind to set her to starboard. She was in a good position to go through. However, just as her stem came up to the lock there was a shout from the shore of "man in the lock" and the chief officer saw a man floundering in the water in the gate recess. To avoid crushing him the engines which were at "dead slow ahead" were put "full speed astern" with an emergency ring. This caused the ship's head to fall immediately to starboard as she had a right-handed propeller and her starboard side struck heavily on the knuckle. The engines were stopped but she rebounded and struck her port side on the opposite knuckle of the lock, forged ahead, when there were further contacts with the lock side, and brought up with her stem just into the basin. The plaintiffs said the emergency was caused by the piermaster falling into the water. Either the recess should have been fenced or the defendants' piermaster was negligent in falling in. In any event, what happened forced the ship to take emergency action and caused her damage for which the Commission was responsible.

On the other hand the defendants declared that the "Lottinge" approached the lock at an excessive speed (3/4 knots), falling off to leeward and shaping to strike the knuckle on the south side. The piermaster saw the danger and hailed her to go astern. She struck the knuckle with her starboard side almost at the same time as he fell into the water and only then were her engines put astern. Therefore, said the Commission, the damage was entirely due to the ship getting out of position and continuing to come on. The piermaster's falling into the water was an irrelevant incident. The court was invited to infer that it was only because of his anxiety over the way the "Lottinge" was approaching that caused the piermaster to so far forget himself as to fall in. As to the lack of fencing round the recess the defendants said there was no evidence to show this was a usual or normal precaution and there was no similar case on record of a man falling into the lock.

After mentioning these facts his Lordship said it seemed to him that the first and crucial question he had to decide was whether the "Lottinge" was making a proper approach at a proper speed until the piermaster fell in or whether she was bound to hit in any event. As far as the facts were concerned he preferred the evidence of the plaintiffs. The pilot, master and chief officer of the ship had given evidence in a way that commanded belief and it was supported by the evidence of the superintendent engineer who happened to be on the lockside. His Lordship said the piermaster himself appeared to be a perfectly honest witness but probably his most vivid recollection of the event was of his falling into the water. He had to compare the evidence of three experienced seafaring men on a question of navigation with that of a number of men of very limited experience who happened to be standing on the quay. His Lordship observed that the pilot of the "Lottinge" had taken some 12,000 ships out of this dock. When a man of this experience told him he was in a position to see his ship was properly lined up for the lock such evidence, unless unacceptable for other reasons, commanded more respect than the impression created in the minds of inexperienced people on shore watching the ship's approach. He had been advised by the Elder Brethren that in the prevailing conditions the proper course would be to keep the vessel's head up into wind until the very last moment. If the plaintiff's story was not true it had been invented with remarkable alacrity because it appeared in essentials in the ship's scrap deck log and official log and seemed confirmed by the ship's engine movement book.

Accordingly, his Lordship found the damage was caused by the emergency action of the ship which resulted from the piermaster falling into the water. He went on that he had had the benefit of the advice of the Elder Brethren who told him it was by no means uncommon to use removable stanchions and chains to guard gate recesses even where the gates were fitted. Any ordinary person might well take the view that a recess of the kind in this lock was in the nature of a trap and it would be folly not to fence it. If it was necessary for him to decide whether the piermaster was guilty of negligence or the Commission themselves were at fault in not fencing he would have found it a question of great difficulty; but it was not necessary to decide it.

His Lordship concluded "persons in the position of those in charge of the 'Lottinge' are entitled to expect that the passage of their vessel will not be encumbered or embarrassed by a man falling into the lock immediately ahead of them. Either . . . . the Commission must take steps to make it practically impossible for a man to fall in or, if this is not considered necessary, must accept that when one of their servants does fall in it can only be due to negligence on his part for which they, as his employers, must be responsible."

It seems clear, therefore, that it would be a sensible precaution on the part of dock authorities to ensure that such places as gate recesses which may constitute traps for the unwary are fenced wherever this is reasonably practicable.

Accident on Dredger in Southampton Water

In Cook v. Dredging and Construction Co. Ltd. the plaintiff, Cook, claimed damages for personal injury caused through falling down a hatch on board the company's blower boat. This blower boat, the "Sliedrecht IX" was about 200-300 yards from the shore in the river Itchen near Fawley. It was alleged that the defendants had broken Regulations 37 (a), 45, 12 (a) and (c) of the Docks Regulations, mainly in failing to safeguard and light the hatch. The defendants denied that the Docks Regulations applied to the "Sliedrecht" as they said she was not a ship and not in any dock, harbour or canal.

His Lordship observed that it was, therefore, necessary to decide whether this structure was a ship or boat or, as the defendants contended, a floating pump. If it was not a ship the Docks Regulations would not apply. The definition of the word "ship" was to be found in the Merchant Shipping Act 1894. "'Ship' includes every description of vessel used in navigation not propelled by oars." In many respects, he continued, this structure is shaped like a ship with deck, hatches, companion ladders and other characteristic equipment. But it is flat bottomed with no rudder or motive power. It seems easy to decide it is a vessel, less easy to decide it is used in navigation. At the time of the accident it was being used in land reclamation and has been moored there for 18 months. However, it was moved considerable distances by tow from time to time, as far as Aden and Holland. After considering the authorities on the matter his Lordship concluded this part of his judgment by saying he thought the "Sliedrecht' should be held to be used in navigation, as it

Litigation in the Port Industry—continued

had often been moved on the sea from place to place, and to be a ship.

But, his Lordship pointed out, the Docks Regulations applied only to processes in a dock, harbour or canal or at a dock, quay or wharf. The place where this "ship" was lying was not a dock, quay or wharf and she was not in a dock, harbour or canal. It would, he thought, hardly be possible to call Southampton Water a canal.

His Lordship held, therefore, that the Docks Regulations did not apply and went on to consider the plaintiff's claim at Common Law which he dismissed on the ground that the accident was solely due to the plaintiff's own negligence.

The interest of this matter, however, lies in the wide meaning given to the word "ship" in relation to this vessel which was only a dredger semi-permanently fixed to the end of a pipe line for the purpose of discharging sludge. If this process had been taking place in a dock, harbour or canal the Docks Regulations would have been fully applicable in view of the fact that a blower boat or dredger is a ship for the purposes of the Regulations.

Publications Received

"Statically-Indeterminate Structures." By R. Gartner, D.Sc. Third edition, 1957. Published by Concrete Publications, Ltd., London. Price 18s.

This edition includes a description of the "plastic-hinge" method of designing reinforced concrete frames. The sections which describe the "influence-coefficient" method have been expanded, and additions have been made to the chapter on curved beams. The section describing distribution methods has been brought up to date, and the design of a Vierendeel girder is described and illustrated. Many examples show the applications of the methods described.

Messrs. Robertson Thain Limited, of Ellesmere Port, Cheshire, have prepared two booklets to assist users of Protected Metal to select the material and construction best suited to their particular requirements.

The booklets are entitled "Code of Practice No. 1, Materials for Covering Uninsulated Pitched Roofs and Walls," and "Code of Practice No. 4, Roof Venting as a Fire Precaution."

Over a period of months it is proposed to issue a complete series of such Codes covering each group of materials or method of construction.

A coloured brochure has been issued by W. G. Bagnall Ltd., Locomotive Builders and Railway Engineers, of Stafford. It contains details of a number of the diesel locomotives recently delivered to customers, both at home and abroad, and describes the Company's capacity to produce diesel powered machines for a wide variety of uses.

The booklet, which contains a number of photographs, concludes by giving brief details of the specifications applied to mechanical parts, diesel engines, transmission and control systems and maintenance.

An attractive brochure, entitled "Rotterdam Harbour Radar Chain," has been produced by Philips Telecommunication of Hilversum. It consists of 32 pp. and is well illustrated and can be obtained free of charge from Hilversum, Holland.

The booklet points out the difficulties of navigation in confined waterways during periods of fog or bad visibility and the advantages to be obtained by the use of radar under those circumstances. The early installations at Liverpool and IJmuiden are mentioned and the brochure refers to the fact that Rotterdam was able to benefit from the operational experience of both those stations. However, the requirements placed on radar at Rotterdam were entirely new; the passage there not only being longer than on the Mersey or the IJ but also the traffic using it more dense. Further, the Nieuwe Waterweg is of such a winding nature that no less than seven stations had to be built. The final sections of the booklet describe the system and method of operation in use at Rotterdam and concludes with technical details of the equipment used.